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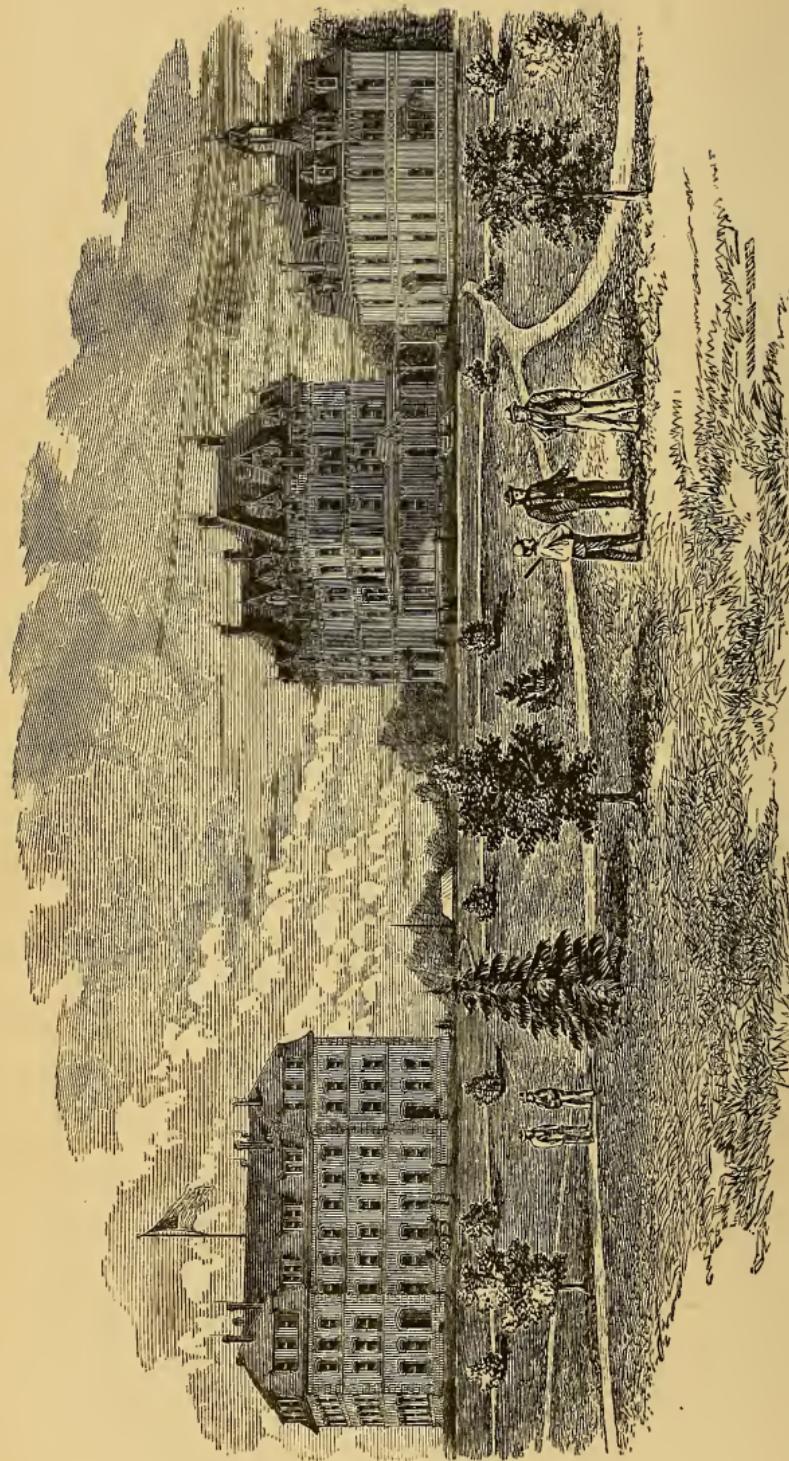
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SEVENTEENTH ANNUAL REPORT
OF THE
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JANUARY, 1880.



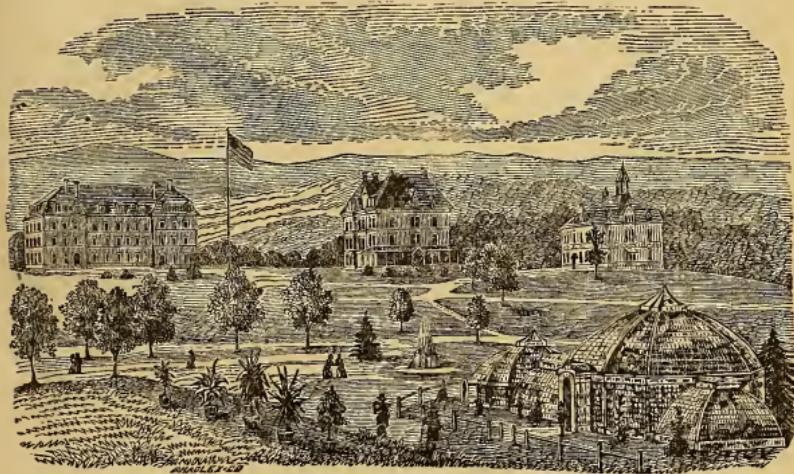
MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST, MASS.

SEVENTEENTH ANNUAL REPORT

OF THE

Massachusetts Agricultural College.

JANUARY, 1880.



BOSTON :

Band, Avery, & Co., Printers to the Commonwealth,

117 FRANKLIN STREET.

1880.

Commonwealth of Massachusetts.

STATE HOUSE, BOSTON,
Feb. 12, 1880.

To his Excellency, JOHN D. LONG:—

Sir,—I have the honor herewith to present to your Excellency and the Honorable Council the Seventeenth Annual Report of the Massachusetts Agricultural College.

Very respectfully your obedient servant,

CHARLES L. FLINT,
President.

Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT, BOSTON,
Feb. 12, 1880.

To the Honorable the Senate: —

I have the honor herewith to transmit for the consideration
of the General Court the Seventeenth Annual Report of the
Massachusetts Agricultural College

JOHN D. LONG.

INDEX.

	PAGE.
Prosperity of the College	9
Financial Status of the College	10
College Facilities	12
Subjects Investigated	13
Opinions of Experts	16
The Farm.	23
Anniversary Exercises	24
Agricultural Act of Congress	26
Act for the Reception of a Grant of Congress, &c.	28
Charter of College	29
Catalogue of Officers, Students, and Graduates	33
Course of Study and Training	41
Calendar for 1880	42
Terms of Admission	42
Expenses	43
Post-Graduate Course	44
Prizes	45
Regulations	46
Scholarships	47
Treasurer's Account	48

ANNUAL REPORT.

To his Excellency the Governor and the Honorable Council: —

THE Trustees of the Massachusetts Agricultural College respectfully submit their Seventeenth Annual Report.

The College is now, for the first time in several years, practically free from debt. Since the adjournment of the last Legislature, it has been thoroughly re-organized, so as to place it, if possible, upon a sound and strong financial or business basis. The current expenses have been reduced by more than ten thousand dollars a year,—sufficient to bring them within the income of the institution, and to leave a small margin.

To effect this reduction, it has been necessary to abolish one professorship and to withhold the president's salary. The salaries of one or two professors, and that of the treasurer, though small already, were somewhat cut down; while a saving of about four hundred dollars has been made in the janitor's work, and a little more than that in the office of farm superintendent. It is impossible to see how the expenses can be reduced to a much lower figure, without seriously crippling the usefulness of the College, and curtailing its efficiency.

The origin of the fund received under the Act of Congress of July 2, 1862, and the Act establishing the College by the Legislature of 1863, were stated in detail in the last Annual Report of the Trustees. As but few copies of that report were printed, and it is not readily accessible, the Acts of Congress and of the Legislature accepting the grant, and establishing the College, are presented on a subsequent page, where they will be found convenient for reference.

The real estate of the College, or what, to use a business phrase, may be called "the plant,"—including the land of

the farm, the dormitories, halls, boarding-houses, and other college and farm buildings,—have cost two hundred thousand dollars. The college fund now in the hands of the State treasurer, and to be kept there in accordance with the provisions of the Act of Congress accepted and agreed to by the formal action of the Legislature, amounts to \$360,067.40. Two-thirds of the income of this fund is by law paid over to the treasurer of the College, and one-third to the treasurer of the Massachusetts Institute of Technology. When it is reported, therefore, that the State has at different times appropriated \$255,000 for the establishment and maintenance of the College, it ought, in justice, to be borne in mind that the greater part of this large aggregate (nearly three-fifths) was given in the form of an addition to the fund arising from the sale of national land scrip, not a dollar of which has been expended, and that the College receives but two-thirds of the income of this fund; so that the advantage of these generous gifts does not wholly accrue to the Agricultural College, and its income is, in consequence, very much less than it otherwise would be.

The financial embarrassments of the College have arisen, in part, from the reduction of the income of the fund in the hands of the State treasurer, consequent upon the general depression of business so universally prevalent during the last few years, and in part, it must be admitted, from want of attention to business details in the expenditures of the farm and other departments of the institution. The re-organization was designed to remedy these defects, and it is believed that it has accomplished the object. The financial status of the College may be presented substantially as follows:—

Real estate	\$200,000 00
Farm stock appraised at	2,747 00
Implements, vehicles, &c.	1,005 50
Farm produce on hand	2,019 25
	<hr/>
	\$205,771 75

RESOURCES.

Income of fund in State treasury	\$12,000 00
Income from other funds	700 00
Income from tuition, room-rent, &c.	3,500 00
Total income	<hr/> \$16,200 00

EXPENDITURES.

Salary account	\$10,100 00
Current expense account	4,000 00
Extra instruction	800 00
Cost	<u>\$14,900 00</u>

The ledger balance and treasurer's report will be found on a subsequent page.

In the above estimate of expenditures no allowance is made for a president's salary. It is impracticable to reduce the teaching force of the College below its present limits. One professorship, as already stated, has been vacated by the action of the trustees during the past year, for the express purpose of keeping the expenses within the income; but it must be evident that this reduction cannot be carried further without great injury to the reputation of the institution. The studies to be pursued must be such in variety, in extent, and in value, as shall meet in good faith the requirements of the Act of Congress to which we are indebted for the original endowment. It must be presumed that in accepting the grant, and obligating itself to fulfil its conditions, the State meant to do it honorably, and to comply with the spirit as well as with the letter of the Act.

No one can fail to see, in reading the conditions of the grant, that it implies something more than the maintenance of a mere manual labor school. The very name of "College" implies a broader and more generous culture: it implies a place of education for the young. Whatever the institution may do in the way of affording models of farming for the public, or in searching for new facts, or the investigation of scientific principles applied to agriculture, must be secondary, and subordinate to the main objects, which the very name given in the Act of Congress implies. The leading and prominent idea conveyed is that learning and labor, science and practice, are to meet in a more profitable life upon the farm; that the chief aim shall be to develop the man in the farmer, and to develop farming through the man engaged in it. This means discipline, which lies at the foundation of all genuine education: it means that we are to do something to educate the mind as well as the hand, to make intelligent men and good citizens, and this object has been kept constantly in view.

It is to be borne in mind, that, at the time the College was founded, there were no models in this country by which our early steps could be guided. Many institutions of the kind had been established and maintained by most of the governments of Europe, and some of them were broader in scope than our own; but they could hardly furnish any complete guide for us in circumstances so widely different. Mistakes might, therefore, have reasonably been expected. But whatever mistakes may have been made by the trustees, acting as the agents of the Commonwealth, the history and the record of the College have, on the whole, been honorable, and highly creditable to the State. It was opened for the admission of students in 1867; and since that time more than six hundred and fifty have been admitted on examination or diploma. The yearly average number of students has exceeded a hundred. Its first class graduated in 1871, and it has graduated a hundred and fifty-seven in all, more than a third of whom are devoting themselves exclusively to agriculture, and pursuits intimately connected with it. In addition, it has given instruction to four hundred others who have taken partial courses in agriculture, and returned to the farms from which they came.

The facilities gathered there for illustration, and for imparting a sound and substantial education, in which the natural sciences constitute the basis, are much greater than has been commonly supposed. The College library consists of over two thousand volumes, mostly on technical subjects, embracing every department of agriculture and the natural sciences. The Knowlton Herbarium contains more than ten thousand species of catalogued plants and botanical specimens. The State cabinet of geology, ornithology, and entomology, is complete in its illustration of the natural history of Massachusetts. The chemical laboratory has accommodations for seventy students. This department is in a high state of efficiency. Practical laboratory work is required of each student daily for an entire year.

The department of physics and civil engineering, under the charge of Professor Graves, is well equipped with apparatus; and practical field-work in surveying, laying out roads, &c., is required of every student, sufficient to give him a knowledge of the most approved instruments, and methods

to be pursued under a great variety of circumstances. The military department, required, officered, and equipped by the General Government, and under the charge of an accomplished army officer, a graduate of West Point, affords unsurpassed facilities for valuable discipline, and is educating far more thoroughly and completely than any militia system can be expected to do, a large number of young men, who go out capable of serving as officers or soldiers in case of emergency. This feature of the course of study and training, as was said in the last Report, is far more important than is generally supposed, and has from the first received the most careful attention, and been eminently successful. The horticultural department, under the charge of Professor Maynard, contains extensive plant and propagating houses, peach, pear, and apple orchards, vineyards and nurseries, affording ample facilities for instruction and for the labor of students, who are paid by the hour for all work beyond the limits of what is called "class-work," which is required of all students six hours a week as a part of the educational course.

The farm, of nearly four hundred acres, must be regarded as an important adjunct of the College, as it affords facilities for observation and labor which could not be had without it. It has been somewhat cramped for means, and has been required to do a vast amount of work — in the way of grading grounds, building roads and walks, and teaming of various kinds — for the College, so that its accounts have not shown its actual working; but its capacities for usefulness in connection with other departments of the College are too obvious to need comment.

Though the education and training of young men must be regarded as the primary object, the contributions of the College to the science and practice of agriculture have been extensive and valuable; and they are universally recognized throughout the country as in the highest degree creditable to the institution and to the State: they have, indeed, in repeated instances, been taken as the basis of important legislative action in other States. The following may be stated as a few of the subjects that have been investigated, most of them exhaustively, and with valuable practical results: —

1. The growing of sugar-beets, the manufacture of sugar

from them, and trials of their value for cattle foods. This industry is soon to grow up in our midst, and to absorb large amounts of capital.

2. The sources of supply and the quantity and quality of our manurial agents. These careful scientific investigations have been the prime means of revolutionizing the manufacture and trade in fertilizers, not only in this State, but throughout the country.

3. Laboratory and physical examinations of the South-Carolina phosphates, and trials of their agricultural value in the raw state, and after treatment with acids.

4. On the use and effect of common salt on the grain and root crops.

5. The chemical and physical condition of the salt-marshes of the State, and the devising of methods by which they can be made available for agricultural purposes.

6. Experiments with compound commercial fertilizers to test their comparative agricultural value, and their value as compared with single elements.

7. To determine what elements will make practically a complete manure on our average soils.

8. Investigations of the quality and composition of commercial fertilizers offered for sale, and the protection of the community, by legal control and inspection, from frauds in them.

9. Observations and study of the phenomena of plant-life.

10. The circulation of sap in plants, and their expansive power during growth.

11. To determine the proportions of different elements of nutrition in feeding substances to be used, to save needless expense, and to produce the most certain results.

12. Experiments on the continuous growth of crops on the same soil, with chemical fertilizers alone.

13. The influence of different kinds of fodder-plants fed to milch cows on the quantity and quality of their milk and butter.

14. Examinations and trials to test the comparative value of different methods of setting and treating milk in the butter-dairy.

15. Practical trials of new implements and a great variety of farm machinery.

16. Investigations as to the effect of girdling fruit-trees and plants to hasten the time of ripening, and to improve the quality of the fruit.
 17. The effect of chemical salts on the carbo-hydrate contents of plants and the quality of fruits.
 18. The construction and repair of common roads.
 19. The growing of early-amber cane, and the manufacture of sugar from its juice.
 20. The influence of temperature, and the vital functions of plants, and temperature of soils and air, on the changes in form of water in soils, and plants and vapor in air.
 21. Investigations in relation to the evaporation and percolation of water from the soil.
 22. The tilling of soils of different characteristics as affecting the loss of water by evaporation.
 23. The determination of the elements of plant-nutrition lost from the soil by leaching and of those it retains.
 24. Investigations in relation to the comparative temperature of the soil and air by day and by night.
 25. The establishment of true meridian lines to regulate the practice of surveying.
 26. The comparative study of the milk of different breeds of cows.
 27. Accurate investigations of the comparative nutritive and feeding value of Northern, Southern, and Western varieties of Indian-corn.
- This list, which might be greatly extended, will serve to show the wide range of scientific study and investigation to which the attention of the College has been devoted. "From this day forward," said Professor Agassiz, when a single one of the above papers was presented to the State Board of Agriculture in 1873,—"from this day forward, the Agricultural College at Amherst has its place among scientific institutions, if it had not before; for only those institutions have a place in the scientific world which do something, and this is something extraordinary: it is a revelation to physiologists. Let me say to those who have not thought that the Agricultural College was doing any thing worth its expense, that the production of this one paper has amply paid for every dollar which the State has thus far bestowed upon the institution."
- Equally unqualified testimony might be presented with ref-

erence to the high character and value of nearly every one of the investigations named in the above list. Every land-surveyor, for instance, knows that previous to the establishment of permanent monuments in every county of the State, giving the accurate meridian lines, the means of correcting his instruments were comparatively difficult of access; and when it is considered that very many of our farms are bounded and described by the points of the compass, often for long distances, it is easy to see that the College has had its influence upon nearly every farm in the State, and that, too, in more ways than one. It can justly challenge comparison with the work of any other similar institution in the country, both in its contributions to science and to the methods and results of intelligent practice.

But these investigations, as already intimated, are secondary, and subordinate to the chief object of the institution,—the education of young men for the practical pursuits of life. That the College has fulfilled its mission in this direction is sufficiently evident from the reports of the Examining Committee of the State Board of Agriculture. In its capacity as a Board of Overseers of the College, it has, for several years, appointed a committee to examine into the condition and working of the institution, and especially to examine the graduating classes from year to year, and to report upon their proficiency. These reports have appeared in the reports of the Secretary of the State Board of Agriculture, where they are accessible to the public.

It will not be out of place, for obvious reasons, to present, as briefly as possible, the opinions of experts who not only had abundant opportunity, but whose special duty it was, to investigate all departments of the College, and pass judgment upon them. The Examining Committee of the past year, Dr. James R. Nichols of Haverhill, editor of "The Journal of Chemistry," chairman, submitted a report, from which the following is an extract: "The duty assigned to me the present year, of visiting the Agricultural College at Amherst, and conducting the examination of the senior class, was pleasant, and also encouraging as regards the usefulness of the institution. The College has labored under some peculiar difficulties and discouragements in the present and past years, owing to the want of means to carry forward the

work of the institution as planned by its officers. The graduating class was found to be small, numbering only seven; but their appearance and acquirements were certainly very creditable.

“The examination was conducted with the view of obtaining as clear an insight into the results of the practical workings of the College as possible; and every facility was afforded by Professor Stockbridge and others that could be desired. For a period of nearly or quite three hours the young men of the class were under examination; and the questions put to them were such as must of necessity call out answers to be made promptly, without the aid of books or instructors; and the results were highly gratifying. A prominent aim was to ascertain if the young men were really qualified to go upon a farm, and conduct its operations in an intelligent and practical manner. It was deemed desirable to learn if they had been instructed in a way to enable them to carry forward the principles of advanced husbandry so as to promote its best interests wherever they might be located. This requires a knowledge of the principles and practice of chemistry, also an acquaintance with the physical character of soils, their origin, and methods of reclamation and fertilization; the nature and nutritive value of the cereal grains, roots, and grasses; the value of the different breeds of animals, and the best methods of feeding and utilizing their products; the care of seeds; and all the implements of husbandry. Upon these points and many others the young men were examined sufficiently in detail to bring out what they really knew; and it is gratifying to report that the answers showed marked proficiency in these departments of study. They were such as to increase our confidence in the usefulness of the College in its direct bearings upon the agriculture of our state and country.”

An equally authoritative indorsement might be presented from every committee whose duty it has been to examine into and report upon the details of the working and efficiency of the College. The Committee of 1870, for instance, Professor Louis Agassiz, chairman, say, “The examinations of the students in classes have been upon agriculture, horticulture, botany, physiology, chemistry, geology, mental and kindred sciences; and we have witnessed the military drills,

and observed with gratification the topographical drawings by the students. We are convinced that the system of instruction is well calculated for the ends in view, that the students are making commendable progress in their studies, and that the several professors are not only accomplished in their respective departments, but earnest and thorough in the prosecution of their duties.

"The leading object in this institution, in compliance with the Act of Congress to which it owes its endowment, is to teach such branches of learning as are related to agriculture, and to include military tactics; and it seems to us that the course of instruction laid down is eminently in consonance with that object, and that the sciences taught are with pointed reference to the uses of the farm. The theory of scientific agriculture is thoroughly taught, and the application of such knowledge is made on the farm, under the direction of the professor of agriculture, who is a practical farmer; and all students are compelled to work at the details of husbandry; so that manual labor becomes a valuable adjunct to mental application. Chemistry, botany, physiology, and zoölogy, are, of course, invaluable to the farmer in regard to the analysis of soils, the use of manures, the food of animals, the growth of grains and fruits, the anatomy and physiology of animals, and the conditions and habits of destructive insects; and mathematics and civil engineering, in the case of the chain, compass, and level, are almost equally necessary.

"Your Committee cannot refrain from alluding to the interest which all the young men take in the drills, and the evident beneficial effect upon their bearing and health, and the value of the accomplished soldiers and officers thus made for the future service of the Commonwealth in the event of another call to send forth her sons for herself or the nation. Were no other result accomplished by this institution, the money of the Commonwealth could be no more judiciously expended; and yet this instruction is but an incident to the regular course."

The Examining Committee of 1871, of which Professor Agassiz was still the chairman, after visiting the College several times, and a careful inspection of all its details, state in their report that "the graduating class, consisting of

twenty-seven members, acquitted themselves with great credit in their several examinations and graduating exercises. Their uniformly gentlemanly bearing and manly appearance were noticeable in a marked degree. No one could look upon that company of young men without realizing the wisdom and foresight of those minds that originated the idea of requiring ‘military tactics’ to be taught in agricultural colleges. The influence of their military training was so manifest, not only upon their general physical health and development, but also in those indispensable attributes which help to make a true gentlemen, that we do not believe too much importance can be laid upon this branch of their education, both as exerting a healthful influence upon the students themselves and as a safeguard for the protection of our country in the future.”

The Examining Committee of 1872, Hon. Leverett Saltonstall, chairman, having attended the quarterly examinations, and the annual graduation exercises in the month of June, say in their report, “It is truly wonderful, that, in so short a time, this admirable institution should have assumed such proportions. Only incorporated in 1863, receiving its first class late in 1867, it now stands in the front rank of agricultural colleges in this country,—an object of reasonable pride to the Commonwealth.

“The classes in April were examined in botany, moral philosophy, agricultural chemistry, mathematics, English literature, and practical farming; at Commencement (*inter alia*), in the relation of science to practice in agriculture, renovation of exhausted soils, rotation of crops, manures, stock-husbandry, and in agriculture as a business-pursuit; in November, in road and railroad construction, zoölogy, use of manures, chemistry, and military drill; all of which were creditable alike to professors and students, the relations between whom seem to be of the most agreeable nature.”

The Committee of 1873, Dr. Horace P. Wakefield, chairman, enter into the condition of the institution at considerable length, both as to the details of the farm and the educational departments, and say, “In November, at the close of the term, the freshmen were examined in physiology, the sophomores in agriculture, the juniors in physics, and the seniors in botany. The classes acquitted themselves credita-

bly, and, when compared with similar performances a little to the south forty years ago, they were of a high order. But facilities, advantages, and times change, and boys must change with them. Not that every student was a perfect master of the subject he had studied, an adept in science,—the teachers themselves would not claim that,—but these young men were familiar with the principles laid down in text-books, and inculcated by their teachers, and showed that they had them fixed in their minds, and could use them in stating a proposition, and defending the same, even when questioned by the professors. Having gathered a few facts, they had made them their own, and had the manliness to stand by their theories, and defend their positions. Evidently they had been taught to think, and that is education in its essence.

“The conservatory is an honor to the institution and the State. From the laboratory, with its appliances for teaching agricultural chemistry, and its liberal, learned, and live professor, so competent to fill such a position anywhere in the world, results may be looked for of the highest order, and expectation without limit must be realized.

“The College affords young men an opportunity to obtain a good, substantial knowledge of the science of farming, and also a fair knowledge of the practical part thereof; and every farmer’s son in the Commonwealth stands a better chance to obtain an education, and prepare himself to meet and grapple successfully with opposing forces, and with honor compete with other young men struggling for honorable distinction in the various pursuits of business,—especially every farmer’s son who belongs to the poorer class, or the class of moderate means,—from the fact that this institution has been established.”

The Committee of 1874, Joseph N. Sturtevant, Esq., chairman, visited the College several times, carefully examined into the workings of all its departments, and say in their report that “the occasion of the examination of the graduating class, to mark who should be the recipients of the Grinnell Agricultural Prizes, was of much interest. The young men, as they replied to the questions addressed to them, in language lucid, unconventional, and thoughtful, showed that they carried with them from the College something of real value. We think of no occasion when the College appeared to so good advantage.

"The presence at the College of a United-States army officer as professor of military science and tactics secures able instruction in this essential part of the education of the complete citizen. If we pass by the chance of war, and the value of possessing among the people individuals fitted by previous training to become militia officers upon sudden call, the value of a military training as promotive of a manly bearing, orderliness, promptness of action, and fitness of speech, &c., is obvious, and recurs with greater force to such as witness the several classes in their military manœuvres. We trust there will be no diminution of interest in the military features of the College."

The Committee of 1875, Hon. Edmund H. Bennett, chairman, made two official visits to the College. Judge Bennett says in his report, that the committee "were deeply impressed with the value and importance of a scientific agricultural school and an experimental farm such as we there possess, and of the general success with which the same has been managed. They desire also to express their high appreciation of the scientific experiments made there, and its importance as a permanent scientific station.

"The 'leading object' of the College is, as its charter declares 'to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.' From this it seems that the primary purpose was to give to farmers' sons and others of the industrial class such useful and practical training as would best fit them for their contemplated pursuits in life. Other branches of scientific and even classical study might also be pursued; but apparently they were, in the mind of the Legislature, but auxiliary to the main purpose of this particular school. Without saying whether one course of study is more or less important as a general rule in society, this institution was not founded as a classical, a medical, or a theological school, but simply as an agricultural college. With its splendid endowment, its large and noble farm, its healthful and admirable situation, its convenient and ample buildings, its admirable and salutary military discipline, its corps of accomplished, scientific, and enthusiastic instructors, it ought to occupy a high position in the agricul-

tural world ; it ought to be ‘a burning and a shining light,’ attracting the attention, and becoming the pride and admiration, of every son of Massachusetts throughout the land.”

The Committee of 1877, O. B. Hadwen, Esq., chairman, reported at considerable length upon the management of the farm, and say, “The productive capacity of the farm is rapidly increasing, the acres yielding larger annual returns. Unproductive lands are being renovated, and brought into profit; rough places being made smooth; the preliminary labors with view of improvement are nearly completed; and the whole outlook of the lands is more pleasing to the eye in all respects. As far as we are able to form an opinion from observation, we are satisfied that the Agricultural College will instruct and turn out men who can use both head and hands,—men pre-eminently fitted for the business relations of life; and that agriculture will be exalted and stimulated by men trained to close and exact observation in the varied departments of rural and farming pursuits.”

The Examining Committee of 1878, Dr. James R. Nichols editor of “The Journal of Chemistry,” chairman, say,—

“The senior class, in the examination for the Grinnell Prizes, fell under our special supervision, and a very thorough examination resulted. Here were twenty students before us who had completed the course of study as set down in the College curriculum ; and an opportunity was afforded for obtaining some knowledge of the extent and value of their acquisition as students of agriculture. The practical nature of the examination is shown by a glance at the topics considered,—‘Origin and Composition of Soils ;’ ‘ Implements of Tillage ;’ ‘ Plants, their Composition, and Sources from which the Material is obtained ;’ ‘ The Susceptibility of the Plant to Modification and Improvement by Cultivation ;’ ‘ Changes produced in Soil by the Growth of Plants ;’ ‘ Methods by which the Fertility of the Soil may be retained, or Exhausted Soils restored ;’ ‘ Grain-Growing, its Influence on the Fertility of the Farm, and how retaining in its Culture ;’ ‘ Root-Crops ;’ ‘ Hay and Grass Crops ;’ ‘ Fruit-Culture on the Farm ;’ ‘ Stock-Husbandry, and the Adaptation of the United States to this Industry ;’ and, ‘ Breeds of Cattle.’

“It is true, a class-examination, however fair and above-board it may be, is not an infallible test of the positive attainments of students in any branch of education : still any one with a clear comprehension of the nature of the topics introduced, and possessing ordinary sagacity, can judge quite satisfactorily and justly of the value of the instruction imparted.

“We say unhesitatingly that the young men acquitted themselves exceedingly well; and no one of them appeared incompetent for taking

charge of a farm, and conducting its affairs in accordance with good sense, and advanced knowledge of husbandry. They had evidently been well drilled in the ‘science of agriculture;’ and the drill embraced the various departments which closely and remotely relate to the interests of the farm. Each of the young men was required to write upon a practical topic, without text-books, or any aid except what his own knowledge supplied ; and thus above twenty essays were placed in the hands of the Committee for examination. This was an important test of scholarship, and supplied a clew to the general training or culture of the students at the College. Some of their papers were quite extended and able essays, worthy even of publication. We are pleased to be able to bear testimony to the good appearance of the graduating class at Amherst.”

THE FARM.

The stock on the farm now consists of twenty-five head, old and young, all but two of which are pure Ayrshires. The Trustees felt obliged, by the advice of the Governor and Council, and the existence of a very considerable debt, which the appropriation of the last Legislature did not cover, to dispose of the Shorthorn, Jersey, and Brittany cattle belonging to the farm ; and it was accordingly sold at auction on the 12th of June, and realized about twelve hundred dollars,— a sum which was found to be quite insufficient to extinguish the debt.

The crops of the season were satisfactory, the first crop of grass yielding nearly a hundred and fifty tons of hay ; while the second crop, or rowen, together with the corn fodder and roots, was nearly sufficient to carry the present stock of cattle through the winter. The farm will have from seventy-five to a hundred tons of hay for sale.

The horticultural department has been nearly or quite self-sustaining, and has been kept in as satisfactory a condition as could be expected, with the large amount of work which has been undertaken. The crops, with one or two exceptions, were good. The vineyard produced a large crop ; but owing to a heavy hail-storm, and perhaps, also, to the want of some additional fertilization, the bunches were small, and required more labor than would otherwise have been the case to prepare them for market. The crop yielded about a hundred and fifty dollars. The nursery is in good condition, and contains a very large stock of peach and other fruit and ornamental trees, consisting of apple, pear, plum,

and peach seedlings (root grafted or budded), quince stocks budded with pear, grape-vines from cuttings, evergreens (mostly Japanese) from cuttings, a large stock of the umbrella pine, Japanese maple, &c. Many of these trees and shrubs will be in a condition for sale the coming year. The severe wind and hail storm which occurred in August, and did extensive damage in most parts of the State, destroyed about five hundred lights in the plant houses. The lights have been reset, and the sash bars painted on the outside. Various other repairs and improvements have been made, entirely by the help of students, who are paid by the hour for their labor.

ANNIVERSARY EXERCISES.

The ninth anniversary exercises, or graduation of the senior class, began with the Farnsworth Prize declamations, in Amherst College Hall, on Monday, June 23. The prizes consist of two gold medals of fifty dollars each, and two silver medals of twenty-five dollars each, to be competed for by members of the sophomore and freshman classes. The judges selected were Professor E. P. Crowell of Amherst College, Dr. James R. Nichols of Haverhill, Benjamin P. Ware, Esq., of Marblehead, W. H. Bowker, Esq., of Boston, and Dr. George Mackie of Attleborough. The prizes in the sophomore class were awarded, to Charles L. Flint, jun., the gold medal, and to Joseph S. Hills the silver medal; in the freshman class, to George D. Allen the gold medal, and to John E. Wilder the silver medal.

The examination of the graduating class for the Grinnell Prizes took place in the chapel on Tuesday; the committee consisting of Dr. James R. Nichols of Haverhill, O. B. Hadwen, Esq., of Worcester, J. F. Brown, Esq., of Lunenburg, and Benjamin P. Ware, Esq., of Marblehead. The examination embraced the following topics:—

SOILS.—Composition and origin of soils; practical varieties of soils, their characteristics and adaptations; soil tillage; the methods and effect of the same.

PLANTS.—The structure of plants; the organs of plants and their offices; composition of plants, and the sources from which the materials of their structure are obtained.

SOILS AND PLANTS.—The effect on the soil of *natural*

plant-growth; effect of artificial production; the condition of an exhausted soil; fertilization, what agents or substances may be employed for the purpose; sources from which they may be obtained, and their influence on soils and plants.

FARM MANAGEMENT.—Farm economy; farm accounts; selection, division, fencing, and cropping of a general farm; the influence of agriculture on national character, wealth, and prosperity; growing grain as a market-product, and its effect on the farm; the fruits of the farm; the demand for cattle and their products, and the source and extent of the supply; improved breeds of cattle, their characteristics.

The Grinnell Prizes were awarded, to Samuel B. Greene of Chelsea a first prize of fifty dollars, to George P. Smith of Sunderland a second prize of thirty dollars. The Hills Botanical Prizes were awarded, first to Walter A. Sherman of Chelsea, fifteen dollars; the second to Richard S. Dickinson of Amherst, ten dollars.

The diplomas were distributed, after the graduation exercises on Wednesday, by his Honor Lieut.-Gov. Long, with an eloquent and appropriate address.

Respectfully submitted by order of the Trustees.

CHARLES L. FLINT, *President.*

BOSTON, Feb. 6, 1880.

AN ACT

DONATING PUBLIC LANDS TO THE SEVERAL STATES AND TERRITORIES WHICH MAY PROVIDE COLLEGES FOR THE BENEFIT OF AGRICULTURE AND THE MECHANIC ARTS.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, —

That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State, a quantity equal to thirty thousand acres for each senator and representative in Congress, to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty, *provided* that no mineral lands shall be selected or purchased under the provisions of this act

SECT. 2. *And be it further enacted,* That the land aforesaid, after being surveyed, shall be apportioned to the several States in sections, or subdivisions of sections not less than one-quarter of a section ; and, whenever there are public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State. And the Secretary of the Interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this act, land-scrip to the amount in acres for the deficiency of its distributive share ; said scrip to be sold by said States, and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever : *provided*, that in no case shall any State to which land-scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any Territory of the United States ; but their assignees may thus locate said land-scrip upon any of the unappropriated lands of the United States, subject to sale at private entry at one dollar and twenty-five cents or less per acre : *and provided further*, that not more than one million acres shall be located by such assignees in any one of the States : *and provided further*, that no such location shall be made before one year from the passage of this act.

SECT. 3. *And be it further enacted,* That all the expenses of management, superintendence, and taxes, from date of selection of such lands, previous to their sales, and all expenses incurred in the management and disbursements of the moncys which may be received therefrom, shall be paid by the States to which they may belong out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied, without any diminution whatever, to the purposes hereinafter mentioned.

SECT. 4. *And be it further enacted*, That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land-scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks yielding not less than five per centum upon the par value of said stocks ; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section fifth of this act), and the interest of which shall be inviolably appropriated by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college, where the leading object shall be—without excluding other scientific and classical studies, and including military tactics—to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.

SECT. 5. *And be it further enacted*, That the grant of land, and land-scrip hereby authorized, shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts.

First, If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall by any action or contingency be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished ; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective Legislatures of said States.

Second, No portion of said fund, nor the interest thereon, shall be applied directly or indirectly, under any pretence whatever, to the purchase, erection, preservation, or repair of any building or buildings.

Third, Any State which may take and claim the benefit of the provisions of this act shall provide, within five years, at least not less than one college, as described in the fourth section of this act, or the grant to such State shall cease : and said State shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the State shall be valid.

Fourth, An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their cost and results, and such other matters, including State industrial and economical statistics, as may be supposed useful ; one copy of which shall be transmitted by mail free, by each, to all other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior.

Fifth, When lands shall be selected from those which have been raised to double the minimum price, in consequence of railroad grants, they shall

be computed to the States at the maximum price, and the number of acres proportionally diminished.

Sixth, No State, while in a condition of rebellion or insurrection against the Government of the United States, shall be entitled to the benefit of this act.

Seventh, No State shall be entitled to the benefits of this act unless it shall express its acceptance thereof by its Legislature within two years from the date of its approval by the President.

SECT. 6. *And be it further enacted*, That land-scrip issued under the provisions of this act shall not be subject to location until after the first day of January, one thousand eight hundred and sixty-three.

SECT. 7. *And be it further enacted*, That the land officers shall receive the same fees for locating land-scrip issued under the provisions of this act as is now allowed for the location of military bounty land warrants under existing laws, *provided* their maximum compensation shall not be thereby increased.

SECT. 8. *And be it further enacted*, That the governors of the several States to which scrip shall be issued under this act shall be required to report annually to Congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

Approved July 2, 1862.

**AN ACT TO PROVIDE FOR THE RECEPTION OF A GRANT OF CONGRESS,
AND TO CREATE A FUND FOR THE PROMOTION OF EDUCATION IN
AGRICULTURE AND THE MECHANIC ARTS.**

Be it enacted by the Senate and House of Representatives in General Court Assembled, and by the authority of the same, as follows:—

SECT. 1. The Commonwealth of Massachusetts hereby accepts the grant offered to it by the United States, as set forth and defined in the act of Congress entitled "An Act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," said act being chapter one hundred and thirty of the statutes of the United States, passed at the second session of the thirty-seventh Congress, and approved by the President July second, eighteen hundred and sixty-two, upon the terms and conditions contained and set forth in said act of Congress; and the Governor of the Commonwealth is hereby authorized and instructed to give due notice thereof to the Government of the United States.

SECT. 2. The Governor is hereby authorized and instructed to receive by himself or his order, from the Secretary of the Interior, or any other person authorized to issue the same, all the land-scrip to which this Commonwealth may be entitled by the provisions of the before-mentioned act of Congress.

SECT. 3. The Governor, by and with the advice and consent of the Council, is hereby authorized and instructed to appoint a commis-

sioner, whose duty it shall be to locate, without unnecessary delay, all the land-scrip which may come into the possession of the Commonwealth by virtue of this act, and to sell the same, from time to time, on such terms as the Governor and Council shall determine. Said commissioner shall give a bond, with sufficient sureties, in the penal sum of fifty thousand dollars, to be approved by the Governor and Council, that he will faithfully perform the duties of his office, and shall render full and accurate returns to them at the end of every six months, or oftener if required to do so by them, of his proceedings under this act. The compensation of said commissioner shall be fixed by Governor and Council, and shall be paid out of the treasury of the Commonwealth, and the Governor is hereby authorized to draw his warrant therefor.

SECT. 4. All moneys received by virtue of this act, for the sale of land-scrip, shall be immediately deposited with the Treasurer of the Commonwealth, who shall invest and hold the same in accordance with the fourth section of the before-mentioned act of Congress. The moneys so invested shall constitute a perpetual fund, to be entitled the Fund for the Promotion of Education in Agriculture and the Mechanic Arts, which shall be appropriated and used in such manner as the Legislature shall prescribe, and in accordance with the said act of Congress.

SECT. 5. This act shall take effect upon its passage. Approved March 18, 1863.

AN ACT TO INCORPORATE THE TRUSTEES OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

Be it enacted by the Senate and House of Representatives in General Court Assembled, and by the authority of the same, as follows:—

SECTION 1. Marshall P. Wilder of Dorchester, Charles G. Davis of Plymouth, Nathan Durfee of Fall River, John Brooks of Princeton, Henry Colt of Pittsfield, William S. Southworth of Lowell, Charles C. Sewall of Medfield, Paoli Lathrop of South Hadley, Phinehas Stedman of Chicopee, Allen W. Dodge of Hamilton, George Marston of Barnstable, William B. Washburn of Greenfield, Henry L. Whiting of Tisbury, John B. King of Nantucket, their associates and successors, are hereby constituted a body corporate, by the name of the Trustees of the Massachusetts Agricultural College, the leading object of which shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life, to be located as hereinafter provided; and they and their successors, and such as shall be duly elected members of said corporation, shall be and remain a body corporate by that name forever. And, for the orderly conducting of the business of said corporation, the said trustees shall have power and authority from time to time, as occasion may require, to elect a president, vice-president, secretary, and treasurer, and such other

officers of said corporation as may be found necessary, and to declare the duties and tenures of their respective offices ; and also to remove any trustee from the same corporation, when, in their judgment, he shall be rendered incapable, by age or otherwise, of discharging the duties of his office, or shall neglect or refuse to perform the same ; and, whenever vacancies shall occur in the Board of Trustees, the Legislature shall fill the same : *provided, nevertheless,* that the number of members shall never be greater than fourteen, exclusive of the Governor of the Commonwealth, the Secretary of the Board of Education, the Secretary of the Board of Agriculture, and the President of the Faculty, each of whom shall be, *ex officio*, a member of said corporation.

SECT. 2. The said corporation shall have full power and authority to determine at what times and places their meetings shall be holden, and the manner of notifying the trustees to convene at such meetings ; and also, from time to time, to elect a president of said college, and such professors, tutors, instructors, and other officers of said college, as they shall judge most for the interest thereof, and to determine the duties, salaries, emoluments, responsiblilities, and tenures of their several offices. And the said corporation are further empowered to purchase or erect, and keep in repair, such houses and other buildings as they shall judge necessary for the said college; and also to make and ordain, as occasion may require, reasonable rules, orders, and by-laws not repugnant to the Constitution and laws of this Commonwealth, with reasonable penalties, for the good government of the said college and for the regulation of their own body, and also to determine and regulate the course of instruction in said college, and to confer such appropriate degrees as they may determine and prescribe ; *provided, nevertheless,* that no corporate business shall be transacted at any meeting unless one-half at least of the trustees are present.

SECT. 3. The said corporation may have a common seal, which they may alter or renew at their pleasure; and all deeds sealed with the seal of said corporation, and signed by their order, shall, when made in their corporate name, be considered in law as the deeds of said corporation; and said corporation may sue and be sued in all actions, real, personal, or mixed, and may prosecute the same to final judgement and execution, by the name of the Trustees of the Massachusetts Agricultural College; and said corporatiohn shall be capable of taking and holding in fee simple, or any less estate, by gift, grant, bequest, devise, or otherwise, any lands, tenements, or other estate, real or personal : *provided* that the clear annual income of the same shall not exceed thirty thousand dollars.

SECT. 4. The clear rents and profits of all the estate, real and personal, of which the said corporation shall be seized and possessed, shall be appropriated to the uses of said college in such manner as shall most effectually promote the objects declared in the first section of this act, and as may be recommended from time to time by the said corporation, they conforming to the will of any donor or donors in the application of any estate which may be given, devised, or bequeathed, for any particular object connected with the college.

SECT. 5. The Legislature of this Commonwealth may grant any

further powers to, or alter, limit, annul, or restrain, any of the powers vested by this act in, the said corporation, as shall be found necessary to promote the best interests of the said college ; and more especially may appoint and establish overseers or visitors of the said college, with all necessary powers for the better aid, preservation, and government thereof. The said corporation shall make an annual report of its condition, financial and otherwise, to the Legislature at the commencement of its session.

SECT. 6. The Board of Trustees shall determine the location of said college in some suitable place within the limits of this Commonwealth, and shall purchase, or obtain by gift, grant, or otherwise, in connection therewith, a tract of land containing at least one hundred acres, to be used as an experimental farm, or otherwise, so as best to promote the objects of the institution ; and, in establishing the by-laws and regulations of said college, they shall make such provision for the manual labor of the students on said farm as they may deem just and reasonable. The location, plan of organization, government, and course of study, prescribed for the college, shall be subject to the approval of the Legislature.

SECT. 7. One-tenth part of all the moneys which may be received by the State treasurer from the sale of land-scrip, by virtue of the provisions of the one hundred and thirtieth chapter of the acts of the thirty-seventh Congress, at the second session thereof, approved July second, eighteen hundred and sixty-two, and of the laws of this Commonwealth, shall be paid to said college, and appropriated towards the purchase of said site or farm, *provided, nevertheless,* that the said college shall first secure, by valid subscriptions or otherwise, the further sum of seventy-five thousand dollars, for the purpose of erecting suitable buildings thereon ; and, upon satisfactory evidence that this proviso has been complied with, the Governor is authorized from time to time to draw his warrants therefor.

SECT. 8. When the said college shall have been duly organized, located, and established, as and for the purposes specified in this act, there shall be appropriated and paid to its treasurer each year, on the warrant of the Governor, two-thirds of the annual interest or income which may be received from the fund created under and by virtue of the act of Congress named in the seventh section of this act and the laws of this Commonwealth, accepting the provisions thereof, and relating to the same.

SECT. 9. In the event of a dissolution of said corporation by its voluntary act at any time, the real and personal property belonging to the corporation shall revert and belong to the Commonwealth, to be held by the same, and be disposed of as it may see fit, in the advancement of education in agriculture, and the mechanic arts. The Legislature shall have authority at any time to withhold the portion of the interest or income from said fund provided in this act, whenever the corporation shall cease or fail to maintain a college within the provisions and spirit of this act and the before-mentioned act of Congress, or for any cause which they deem sufficient.

Approved April 29, 1863.

CATALOGUE

OF

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

1879.

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

Board of Trustees.

MEMBERS EX OFFICIIS.

HIS EXCELLENCY JOHN D. LONG, *Governor of the Commonwealth.*

CHARLES L. FLINT, *President of the College.*

JOHN W. DICKINSON, *Secretary of Board of Education.*

CHARLES L. FLINT, *Secretary of Board of Agriculture.*

MEMBERS BY ELECTION.

MARSHALL P. WILDER	BOSTON.
CHARLES G. DAVIS	PLYMOUTH.
HENRY COLT	PITTSFIELD.
PHINEAS STEDMAN	CHICOOPEE.
JAMES S. GRINNELL	GREENFIELD.
HENRY L. WHITING	CAMBRIDGE.
DANIEL NEEDHAM	GROTON.
WILLIAM KNOWLTON	UPTON.
JOHN CUMMINGS	WOBURN.
RICHARD GOODMAN	LENOX.
BENJAMIN P. WARE	MARBLEHEAD.
O. B. HADWEN	WORCESTER.

Executive Committee.

CHARLES L. FLINT,

HENRY COLT.

PHINEAS STEDMAN,

WILLIAM KNOWLTON,

Secretary.

CHARLES L. FLINT OF BOSTON.

Auditor.

HENRY COLT OF PITTSFIELD.

Treasurer,

JOHN CUMMINGS OF WOBURN.

Board of Overseers.

THE STATE BOARD OF AGRICULTURE.

Examining Committee of Overseers.

JAMES R. NICHOLS	of Haverhill.
JOHN F. BROWN	of Lunenburg.
JOHN B. MOORE	of Concord.
AVERY P. SLADE	of Somerset.
E. F. BOWDITCH	of Framingham.

Members of Faculty.

CHARLES L. FLINT, PRESIDENT.

LEVI STOCKBRIDGE,
*Professor of Agriculture.*HENRY H. GOODELL, M.A.,
*Professor of Modern Languages.*CHARLES A. GOESSMANN, PH.D.,
*Professor of Chemistry.*WILLIAM B. GRAVES, M.A.,
*Professor of Physics and Civil Engineering.*SAMUEL T. MAYNARD, B.S.,
*Professor of Botany and Horticulture.*FIRST LIEUT. CHARLES MORRIS, FIFTH ARTILLERY, U.S.A.
*Professor of Military Science and Tactics.*GEORGE MONTAGUE,
*Instructor in Book-keeping.*JOHN W. CLARK, B.S.,
Superintendent of Nurseries.

Graduates of 1879.^s

Dickinson, Richard Storrs	Amherst.
Green, Samuel Bowdlear (Boston Univ.)	Chelsea.
Rudolph, Charles (Boston Univ.)	New Haven, Conn.
Sherman, Walter Alden (Boston Univ.)	Lowell.
Smith, George Parmenter (Boston Univ.)	Sunderland.
Swan, Roscoe Westley (Boston Univ.)	Framingham.
Waldron, Hiram Edmund Baylies (Boston University)	Rochester.
Total	7

Senior Class.

Endicott, George	New-York City.
Fowler, Alvan Luther	Westfield.
Gladwin, Frederic Eugene	Westfield.
Lee, William Gilbert	Amherst.
McQueen, Charles Manjie	Longmeadow.
Parker, William Colvard (Boston Univ.)	Wakefield.
Ripley, George Arms	Worcester.
Stone, Almon Humphrey	Phillipston.
Wood, Lewis	West Upton.
Total	9

Junior Class.

Bowman, Charles Abel	Billerica.
Clark, Wallace Valentin	Amherst.
Fairfield, Frank Hamilton	Waltham.
Flint, Charles Louis, jun.	Boston.
Hall, Albert Oliver	Chelsea.
Hills, Joseph Lawrence	Boston.
Howe, Elmer Dwight	Marlborough.
Howe, Winslow Brigham	Marlborough.
Perry, Alfred Dwight	Worcester.
Peters, Austin	Boston.
Rawson, Edward Briggs	Brooklyn, L.I.
Sattler, Hermann Charles	Baltimore, Md.
Spalding, Abel Walter	Billerica.
Whitaker, Arthur	Needham.
Wilcox, Henry Harrison	Nawiliwili, S.I.
Total	15

¹ The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the College during any portion of the year 1879.

Sophomore Class.

Abercrombie, Fred Norman	Boston.
Allen, Francis Sherwin	Medfield.
Allen, George Dickinson	Amherst.
Aplin, George Thomas	Putney, Vt.
Beach, Charles Edward	Hartford, Conn.
Bingham, Eugene Percival	Fitchburg.
Bishop, William Herbert	Diamond Hill, R.I.
Boynton, Charles Enoch	Groveland.
Brodt, Harry Snowden	Dansville, N.Y.
Brown, Charles Henry	Taunton.
Carr, Walter Frank	Clinton.
Chandler, Everett Sawyer	Coldwater, Mich.
Chapin, Henry Edgerton	Springfield.
Chase, Harry Kirk	New-York City.
Chipman, Frank Ellsworth	Beverly.
Clay, Cassius Morey	Westminster, Vt.
Comins, William Henry	North Hadley.
Cooper, James Willard	East Bridgewater.
Currier, George Francis	Amherst.
Cutter, John Ashburton	Boston.
Damon, Samuel Chester	Lancaster.
Deuel, Frank Dennis	Amherst.
Dutton, Charles Kitteridge	Hatfield.
Fish, Charles Sumner	South Boston.
Floyd, Charles Walter (Boston Univ.)	Boston.
Goodale, David	Marlborough.
Gowdy, Harry Morgan	Westfield.
Harris, Louis Lincoln	Westfield.
Hillman, Charles Dexter	Hardwick.
Holmes, Samuel Judd	Montclair, N.J.
Howard, Joseph Henry	Hyannis.
Howe, George Dickinson	North Hadley.
Jones, Frank Waldo	South Scituate.
Jones, Nathaniel Nelson	Georgetown.
Joyner, Frank Hall	North Egremont.
Kingman, Morris Bird	Amherst.
Kinney, Burton Arial	Lowell.
Krauss, Alonzo Augustus	Boston.
Livermore, Nathaniel Lyon	Alexandria, Minn.
Lindsey, Frank B.	Clayton.
May, Frederick Goddard	Boston..
Meade, William George	Springfield.

Miller, Willie Smith	South Hadley.
Morse, William Austin	Boston.
Myrick, Herbert	Concord.
Paige, James Breckenridge	Prescott.
Perkins, Charles Brookhouse	Salem.
Perkins, Dana Edson	Lynn.
Platt, John Cheney	New-York City.
Plumb, Charles Sumner	Westfield.
Putnam, Henry Anderson	Worcester.
Shiverick, Asa Frank	Wood's Holl.
Stone, Winthrop Ellsworth	Amherst.
Taft, Levi Rawson (Boston Univ.)	Mendon.
Taylor, Alfred Howland	Yarmouth.
Taylor, Frederic Patterson	Boston.
Thurston, Wilbur Herbert (Boston Univ.)	Upton.
Warner, Clarence Duane (Boston Univ.)	Granby.
Wheeler, Henry Lewis	Great Barrington.
Wheelock, Victor Lamont	North Amherst.
Wilder, John Emery	Lancaster.
Willard, Daniel	North Hartland, Vt.
Williams, James Stoddard	Glastonbury, Conn.
Wilmarth, Frederick Augustus (Boston University)	Upton.
Windsor, Joseph Libbey	Grafton.
Total	65

Freshman Class.

Bagley, Sydney Currier	Boston.
Bishop, Edgar Allen	Diamond Hill, R.I.
Chaplin, John Dorr Hayward	East Bridgewater.
Fletcher, Frank Howard	Townsend.
Hevia, Alfred Armand	Havana, Cuba.
Holman, Samuel Morey	Attleborough.
Manton, William James	Lime Rock, R.I.
Minott, Charles Walter	Westminster.
Nourse, David Oliver	Bolton.
Owen, Henry Willard	Amherst.
Preston, Charles Henry	Danvers.
Seldon, John Lincoln	Ashfield.
Smith, William Edward	Sheffield.
Tryon, Charles Osmer	So. Glastonbury, Conn.
Wheeler, Homer Jay	Bolton.

Total 15

Select Class.

Brooks, William Cummings	Boston.
Casparian, Gregory	Nicomedia, Turkey.
Chandler, Willard Mayne	South Natick.
Chittenden, Edgar Davis	Sunderland.
Clarke, Henry Little	New Bedford.
Cochran, Robert Armstrong, jun.	Maysville, Ky.
Delano, Julio Joaquin	Valparaiso, Chili.
Hashiguchi, Boonzo	Tokio, Japan.
Hill, Charles Henry	North Amherst.
Jackson, Andrew	San Francisco, Cal.
Johnson, Frank Prescott	Waltham.
Jones, Edward Spaulding	Worcester.
Knowles, William Fletcher, jun.	North Cambridge.
Leonard, Arthur	Rock.
McKenna, James Peter	Amherst.
Parsons, Howard Albert	Enfield, Conn.
Porter, Royal Luther	Brooklyn, L.I.
Smith, Benjamin Salter	New-York City.
Smith, Hiram Fred Markley	Cleveland, O.
Smith, John Leland	Barre.
Wolfe, Walter Madson	Montclair, N.J.
Wood, Wilbur	West Upton.
Young, Charles Elisha	Amherst.
Total	23

Post-Graduates.

Clark, B.S., Atherton (Boston Univ.)	Amherst.
Hunt, B.S., John Franklin	Amherst.
Lovell, M.A., Henry Lyman (Amherst College)	Amherst.
Stockbridge, B.S., Horace Edward (Bos- ton University)	Amherst.
Total	4

Summary.

Post-Graduates	4
Graduates of 1879	7
Senior Class	9
Junior Class	15
Sophomore Class	65
Freshman Class	15
Select Class	23
Total	138

COURSE OF STUDY AND TRAINING.

FRESHMAN YEAR.

First Term. — Chemistry, 3 hours each week ; Human Anatomy, Physiology, and Hygiene, 3 hours ; Algebra, 5 hours ; English, 2 hours ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Manual Labor, 6 hours.

Second Term. — Inorganic Chemistry, 3 hours ; Botany, 3 hours ; Geometry, 5 hours ; Agriculture, 3 hours ; English, 2 hours ; Elocution, 1 hour ; Freehand Drawing, 3 hours ; Military Drill, 3 hours.

Third Term. — Systematic Botany, 4 hours ; Geometry, 4 hours ; French, 5 hours ; Elocution, 2 hours ; Agriculture, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SOPHOMORE YEAR.

First Term. — Systematic Botany, 3 hours each week ; Geometry, 4 hours ; French, 5 hours ; English, 1 hour ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Manual Labor, 6 hours.

Second Term. — Geology, 3 hours ; Trigonometry, 5 hours ; French, 4 hours ; English, 1 hour ; Agriculture, 3 hours ; Declamation, 1 hour ; Drawing, 3 hours ; Military Drill, 3 hours.

Third Term. — Zoölogy, 5 hours ; Surveying, 5 hours ; Agriculture, 2 hours ; English, 3 hours ; Declamation, 1 hour ; Leveling, 3 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

JUNIOR YEAR.

First Term. — Mechanics, 5 hours each week ; Entomology, 2 hours ; Market-Gardening, 2 hours ; Horticulture, 2 hours ; Military Drill, 3 hours ; Manual Labor, 6 hours.

Second Term. — Physics, 5 hours ; Practical Chemistry, 9 hours ; Drawing, 3 hours ; Agricultural Debate, 1 hour ; Declamation, 1 hour ; Military Drill, 3 hours.

Third Term. — Astronomy, 4 hours ; Practical Chemistry, 9 hours ; Declamation, 1 hour ; Stock and Dairy Farming, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SENIOR YEAR.

First Term. — English Literature, 4 hours each week ; Practical Chemistry, 7 hours ; Book-keeping, 2 hours ; Roads and Railroads, 3 hours ; Military Science, 2 hours ; Original Declamation, 1 hour ; Military Drill, 3 hours.

Second Term. — English Literature, 4 hours ; Theses, 1 hour ; Mental Science, 4 hours ; Agriculture, 2 hours ; Veterinary Science, 3 hours ; Military Science, 2 hours ; Microscopy, 4 hours ; Military Drill, 3 hours.

Third Term. — Veterinary Science, 2 hours ; Military Science, 2 hours ; Botany, 3 hours ; Landscape-Gardening, 3 hours ; Rural Law, 1 hour ; Lectures on English Language, 2 hours ; Theses, 1 hour ; Agricultural Review, 4 hours ; Military Drill, 4 hours.

CALENDAR FOR 1880.

The third term of the collegiate year begins March 25, and continues till June 23.

The first term begins Aug. 26, and continues till Nov. 24.

The second term begins Dec. 9, and continues till March 9, 1881.

There will be an examination of candidates for admission to the College, at the Botanic Museum, at nine A.M., Tuesday, June 22, and also on Thursday, Aug. 26.

The Farnsworth Prize Declamations take place Monday evening, June 21.

The public examination of the graduating class for the Grinnell Prize for excellence in agriculture, and the examination of the other classes in the studies of the term, will take place on Tuesday forenoon, June 22.

The exercises of Graduation Day occur June 23.

ADMISSION.

Candidates for admission to the Freshman Class are examined, orally and in writing, upon the following subjects : English Grammar, Geography, Arithmetic, Algebra through simple equations, and the History of the United States.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the College until he is fifteen years

of age; and every student is required to furnish a certificate of good character from his late pastor or teacher, and to give security for the prompt payment of term-bills. Tuition and room-rent must be paid in advance at the beginning of each term; and bills for board, fuel, &c., at the end of every term.

The regular examinations for admission are held at the Botanic Museum, at nine o'clock A.M., Tuesday, June 22, and on Thursday, Aug. 26; but candidates may be examined and admitted at any other time in the year.

EXPENSES.

Tuition	\$12 00 per term.
Room-rent	5 00 to 10 00 “
Board	2 50 to 3 50 per week.
Expenses of chemical laboratory to students of practical chemistry	10 00 per term.
Public and private damages, including value of chemical apparatus destroyed or injured .	At cost.
Annual expenses, including books	\$250 00 to 350 00

REMARKS.

The regular course of study occupies four years; and those who complete it receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the College may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the College, thereby becoming entitled to all the privileges of its alumni.

The instruction in the languages is intended to qualify the graduates to write and speak English with correctness and effect, and to translate French with facility. The scientific course is as thorough and practical as possible; and every science is taught with constant reference to its application to agriculture and the wants of the farmer.

The instruction in agriculture and horticulture includes every branch of farming and gardening which is practised in Massachusetts, and is both theoretical and practical. Each topic is discussed thoroughly in the lecture-room, and again in the plant-house or field, where every student is obliged to labor. The amount of required work, however, is limited to six hours per

week in order that it may not interfere with study. Students are allowed to do additional work for wages, provided they maintain the necessary rank as scholars.

Indigent students are allowed to do such work as may offer about the College or farm buildings, or in the field ; but it is hardly possible for one to earn more than from fifty to one hundred dollars per annum, besides performing other duties. So far as is consistent with circumstances, students will be permitted to select such varieties of labor as they may, for special reasons, desire to engage in.

Those who pursue a select course attend recitations and lectures with the regular classes ; but those properly qualified, who desire special instruction in botany, chemistry, civil engineering, veterinary science, agriculture, or horticulture, may make private arrangements with the officers having charge of these departments.

An expenditure of from ten to fifty dollars is necessary to provide furniture, which may be purchased at reasonable rates, either new or second-hand. At the beginning of the second term of attendance each student is required to provide himself with the full uniform prescribed for the battalion of Agricultural Cadets, the cost of which is about thirty dollars.

On Sundays students are required to attend church in the forenoon, and invited to join a class for the study of the Bible in the afternoon. They will be permitted to select their place of attendance from among the churches in the town, of the following denominations ; viz., Baptist, Congregational, Episcopalian, Methodist, and Roman Catholic.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the College or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the faculty in their respective departments.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The library of the College contains about two thousand volumes. Among them are several sets of cyclopædias, magazines, and newspapers, reports of agricultural societies and state boards of agriculture, and many standard works on agriculture and

horticulture. There are also many useful works of reference in chemistry, botany, surveying, and drawing.

The faculty and students also have the privilege of drawing books from the excellent library of Amherst College, which contains over thirty thousand volumes.

The State Cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the College, and is of much value for purposes of instruction.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods, and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About fifteen hundred species and varieties of plants are cultivated in the Durfee Plant-House, affording much pleasure and information to students and visitors.

The class in microscopy has the use of seven of Tolles' best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

PRIZES.

FARNSWORTH RHETORICAL MEDALS.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, which is to be used for the purchase of gold and silver medals, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Clafin of Boston has given the sum of one thousand dollars for the endowment of a first prize of fifty dollars, and a second prize of thirty dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILLS BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1880, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

REGULATIONS.

I.—Students are forbidden to combine for the purpose of absenting themselves from any required exercise, or violating any known regulation of the College.

II.—The roll shall be called five minutes after the ringing of the bell for each exercise of the College, by the officer in charge, unless a monitor be employed; and students who do not answer to their names will be marked absent, provided that any student coming in after his name has been called shall be marked tardy. Two tardinesses shall be reckoned as one absence.

III.—Absence from a single exercise may be allowed or excused by the officer in charge of the same, if requested beforehand; but permission to be absent from several exercises must be obtained in advance from the general excusing officer, or from the president. In such cases the officer excusing will furnish a certificate of excuse, which shall state the precise time for which absence is permitted, and which shall be a satisfactory reason for absence from all exercises occurring within the time specified.

IV.—Excuses for all absences, whether with permission obtained beforehand or not, must be submitted to the excusing committee. They must be rendered promptly within one week from the date of absence; and those deemed unsatisfactory will be returned to the student with the indorsement of the committee.

V.—Whenever the aggregate number of unexcused absences in all departments reaches five, the student so delinquent shall be informed of the fact. When the number of such absences reaches eight, the parent or guardian of the student shall be informed of his delinquency; and, when ten such delinquencies are justly recorded against any student, his connection with the College may be terminated.

VI.—Students are forbidden to absent themselves without excuse from the regular examinations, to give up any study without permission from the president, or to remove from one room to another without authority from the officer in charge of the dormitory buildings; and no student shall be permitted to make such change until he has procured from the inspecting officer a written statement that the room about to be vacated is in perfect order.

VII.—Students shall be required to attend the church of their selection regularly on Sunday morning, and report in writing to the excusing officer, during the ensuing week, whether they attended or not.

VIII.—The record of deportment, scholarship, and attendance, will be carefully kept; and, whenever the average rank of a stu-

dent falls below fifty, he will not be allowed to remain a member of the College, except by a special vote of the faculty. Admission to the College, and promotion from class to class, as well as to graduation, are granted only by vote of the faculty.

IX.— Students are required to abstain from any thing injurious to the buildings and other property of the College, and in all respects to conduct themselves with propriety.

X.— Parents and guardians are specially urged to co-operate with the faculty in securing the faithful attendance of students upon every appointed exercise of the College.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given. In the south dormitory the main corner-rooms are fifteen by eighteen feet, and the adjoining bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner-rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

SCHOLARSHIPS.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the faculty to such indigent student as they may deem most worthy.

The Trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution; and should enter College with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture. To every such student the cash value of a scholarship is one hundred and forty-four dollars.

[Feb. '80.]

John Cummings Treasurer.
C. B. Cr. AGRICULTURAL COLLEGE,
MASSACHUSETTS IN ACCOUNT WITH

1879.	Jan. 1.	To Balance, cash, in hands of George Montague, Receipts, Farm account	\$760 20	1879.	By Expenses, Farm account	\$3,795 16
		Term bill account	2,938 05		Current expense account	4,940 93
		Grinnell Prize Fund account	5,932 63		Term bill account	2,255 97
		Totten Prize Fund account	80 00		Interest account	713 42
		Interest account, rebate on notes	5 00		Hills Fund account	1,148 26
		Hills Fund, income	32 45		Mary Robinson Fund	70 00
		Mary Robinson Fund, income	640 50		Botanical account	1,811 94
		Botanical account	70 00		Salary account	17,461 30
		State Endowment Fund, income	1,602 19		Bills payable	33,350 00
		State appropriation	12,720 11		Laboratory account	385 96
		Bills payable	32,000 00		Farnsworth Prize Fund	60 73
		Farnsworth Prize Fund, income	9,350 00		Grinnell Prize Fund	80 00
		Salary account	100 00		Whiting Street Fund, invested by vote of trustees,	1,000 00
		Expense account	300 00	1880.		
			89 26			
			28 77			
			1,000 00			
				Jan. 16.	By Balance, cash	575 49
						\$67,649 16

JOHN CUMMINGS, *Treasurer.*

SENATE.

No. 14.

EIGHTEENTH ANNUAL REPORT
OF THE
MASSACHUSETTS
AGRICULTURAL COLLEGE.

JANUARY, 1881.



BOSTON:
Rand, Avery, & Co., Printers to the Commonwealth,
117 FRANKLIN STREET.
1881.

SENATE.

No. 14.

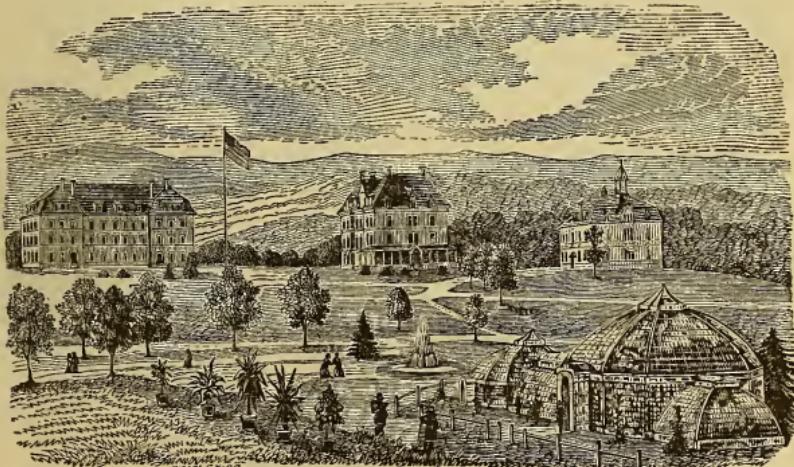
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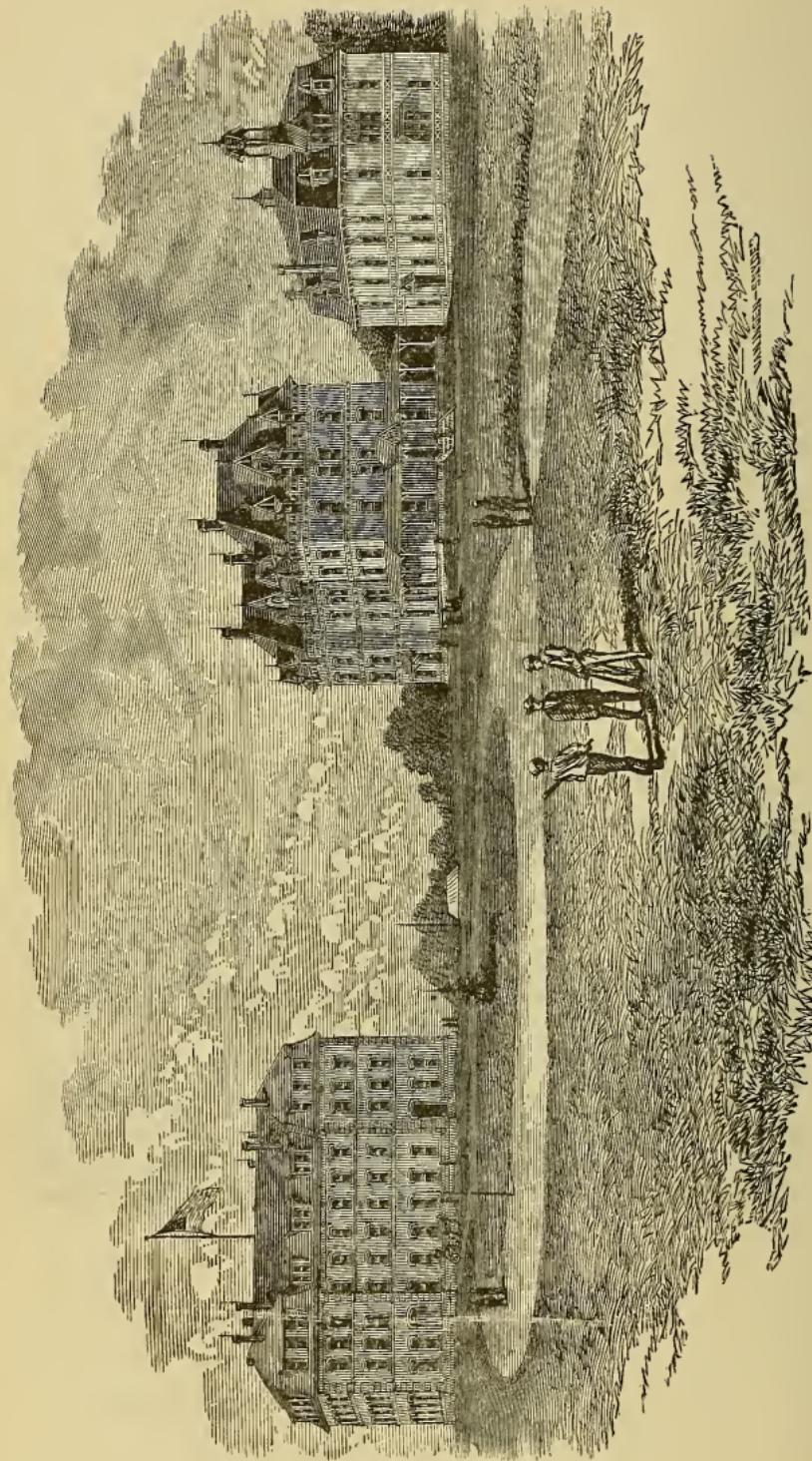


BOSTON:

Bard, Avery, & Co., Printers to the Commonwealth,

117 FRANKLIN STREET.

1881.



Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT, BOSTON, Jan. 14, 1881.

To the Honorable Senate.

I HAVE the honor herewith to transmit for the information and use of the General Court the Eighteenth Annual Report of the Trustees of the Massachusetts Agricultural College.

JOHN D LONG.

Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, MASS., Jan. 13, 1881.

To His Excellency JOHN D. LONG.

DEAR SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Eighteenth Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,
Your obedient servant,

LEVI STOCKBRIDGE, *President.*

INDEX.

	PAGE
The School	12
Improvements of the Year	15
College Farm	17
Horticultural Department	19
Experiment Station	19
The Chemical Department	22
Report of Botanic Department	24
Catalogue of Officers, Students, and Graduates	31
Course of Study and Training	45
Calendar for 1881	46
Terms of Admission	46
Expenses	47
Post-Graduate Course	48
Books, Apparatus, and Specimens in Natural History	49
Prizes	49
Regulations	51
Size of Rooms	51
Scholarships	51
Report of the Board of Overseers	53
Report of Committee	57
Treasurer's Account	60

ANNUAL REPORT.

To His Excellency the Governor and the Honorable Council.

THE Trustees of the Massachusetts Agricultural College respectfully submit their Eighteenth Annual Report.

In the last Annual Report a detailed statement was made of the efforts of the Trustees of the College to contract the field of its activities to correspond with its diminished income and the mandate of the Legislature by reducing the wages for student labor, by discharging a portion of the Faculty, lessening the salaries, and increasing the duties of those retained, and by deferring the procurement of appliances to make the exercises of the recitation-room more efficient and instructive.

The resignation of President William S. Clark, whose popular talents and prestige as a successful educator contributed so largely to the success of the College during the first eleven years of its operations, and the two subsequent changes of its executive head, making three administrations in a period of ten months, were a very important part of these modifications, and were sufficiently radical and influential to derange or stagger an older and more thoroughly established institution. It is perhaps now too early to determine what is to be the ultimate result of these changes on the College as an educational institution, or on its position and influence in winning the community to such an accord with its plans and purposes, as to secure the desired accession of students, and the sympathetic aid of a liberal public. The enactment of the Legislature of 1879, growing in part undoubtedly out of the strife of parties to secure the commendation of the people as the special champions of retrenchment and financial reform, and which made the Governor and Council a commission to examine into the status

of the institution with the intent of severing its connection with, and releasing the State from, its obligations and guaranties to the General Government respecting it, culminated in a report to the Legislature of 1880, practically recommending that the College with all its real and personal estate, with its trust funds received from the United States for its specific support, be given to Amherst College, and further effort to maintain it be abandoned. The phraseology of the resolve creating the commission, and defining its work, was so peculiar, that it had little or no discretionary power, and there was no other course for it to take. But it was a measure so radical and subversive of the integrity of the State, so forgetful of the intent and design for which Congress gave its endowment fund, that it not only met with no favorable public response, but with almost universal remonstrance, especially so by the agricultural portion of the community; and no effort was made by the Legislature to accept of the proposal, or to give it legal force. It is charitable to believe that the original authors of this measure had no intent to destroy or injure the institution for the benefit of another, but an honest purpose to relieve the tax burden of the Commonwealth. But the suspicion of such a purpose called out the latent friendship and sympathies of farmers and the friends of high education for agricultural pursuits, and aroused them to a consciousness of the fact, that, though the College was the ward of the State, its perpetuity, power, and influence could be enhanced by their active moral support. This effort to settle, or unsettle, the status of the College, resulted in giving it strength. And it may be reasonable to conclude that just this struggle was required to permanently establish its relations to the State, and to show that there must be a union of public and private duty and responsibility, if it would attain the highest prosperity and usefulness.

The operations of the past year have demonstrated the fact that the College can live, and secure, temporarily at least, a certain measure of success on its present basis. But we should remember that it was endowed by the Congress of the United States, with the approval of the nation, for the legally defined, but unique and noble purpose of giving advanced education to the producing classes, to secure their

elevation, and increase their wealth-producing power; was adopted by Massachusetts, under bond to foster, maintain, and provide for it; and it cannot be seriously said that this basis is a credit to, or in keeping with, its high origin, or that it can be very efficient in accomplishing its originally designed work. The Trustees act as the agents of the State, and are ready at all times to obey its behests by employing the means placed at their disposal, be they large or small, in the best manner their judgment can direct to secure the greatest and best possible results. But they cannot believe that the very large expenditures made during the early years of its history were enhanced by either extravagance or folly. They accepted in good faith the clearly expressed ideas of the originators of the College grant; and, guided by the detailed plan of the institution adopted by the Governor and Council by the direction of the Legislature, they made an earnest endeavor to provide for it in farm lands and buildings, dormitories and boarding-houses for students, structures for recitation-rooms and other public purposes, physical, chemical, and mathematical apparatus, and other appliances for the lecture-room, to elucidate the facts of science, and to convey knowledge, discipline, and culture to the pupil. All this in the direction of, but not above, or hardly equal to, the model of it, which was exhibited in the Statutes of the United States and Massachusetts. The total of the expenditures for all these purposes was a large sum, but no larger than should have been anticipated by the legislators, who thoroughly discussed the objects to be attained, and adopted the plan; but too large in the opinion of any one who considered the plan to be simply that of a manual-labor school, or one of an inferior grade.

In some respects, also, the period from 1867 to 1873, when the larger expenditures occurred, was very unfavorable. The sums appropriated were estimated and recorded as dollars; but to the Trustees they were not dollars of a value currency. Neither could they be exchanged for a dollar of real value in any of the details of the expenditure. Without any choice on their part, they were obliged to expend the fixed sums at their disposal for the countless needs of their work, receiving small values at fictitious prices, and were perhaps somewhat influenced by the ex-

panded views of all private business men and municipalities then in vogue. If, during the period named, and when these large outlays were principally made, they had not been obliged to pay common laborers from two to two and a half, and mechanics from three to four dollars per day, and for every form of material required in that proportion, instead of one and two dollars per day for different kinds of labor, and material on that basis, as now, the record would have shown an expenditure of a hundred thousand dollars less than it now does.

The personal farm equipment of stock, teams, tools, implements, vehicles, and machines, was unavoidably procured on the high-price basis; and if from year to year the inventory has shown a decreased money value, notwithstanding the increase of stock, the result can only be charged to that general depreciation of prices which has effected the entire property of the State, and plunged many careful, judicious men into ruin.

To reap the full advantage which the property acquired under these circumstances is capable of yielding, a larger annual income is required.

Though extremely desirous of securing, for the institution, every modern appliance of practical education and culture, and of enlarging the sphere of its influence in its special field, yet we are satisfied, that, by the practice of the most scrupulous economy in the management of its affairs, and some personal sacrifice on the part of its Faculty, its future will not be devoid of usefulness.

THE SCHOOL.

Considering all the circumstances of the case, the work of the year may be pronounced a success. There has been no serious diminution in the number of students. They have manifested their usual interest in their specific routine of study, work, and drill, and in the general welfare and progress of the College. They were never before so public-spirited, and eager to contribute their effort for its improvement, as is evinced by the erection by the class of '82 of an elegant fountain, at the cost of two hundred and fifty dollars, in the centre of the grass-plat in front of the buildings, which adds greatly to the beauty of the scene. It is worthy

of note, that they have taken the most lively interest in the agricultural operations of the surrounding vicinity, attending and participating in the essays and discussion of the agricultural organizations, and serving as judges, and writing reports on different departments of their exhibitions. The good has been mutual. The farming community has taken much more interest in the young men as such, as students of agriculture, and in the College, its work, and progress.

An invitation having been extended to the College Battalion to attend and participate as a military organization in the ceremonies attendant on the celebration of the settlement of Boston on the 17th of September, and our late president, Charles L. Flint, and Isaac Farnsworth, Esq., having generously offered to defray the expense of transportation, the invitation was accepted. Under the command of its military instructor, Lieut. Charles Morris, it left Amherst on Thursday, Sept. 16, after College exercises, and returned and broke ranks for home duty on the 18th. There was a doubt in the minds of some of the College officers, of the propriety of the excursion, and fears of its influence on the students individually, and on the institution; but the result was altogether favorable. By the quiet and gentlemanly deportment of the young men when out of the ranks, and the soldierly appearance, the precision of movement, and admirable drill exhibited by the battalion in the procession and on the line of march, they won the highest praise of their commanding officer, and the warm encomiums of both friends and strangers. In the exhibition of all the qualities which combine to make an efficient military organization, it was, by the best judges, accredited as second to but one in the immense military array of the occasion.

The devotion of the officers of the different departments, and the alacrity and cheerfulness with which they discharge their increased and arduous duties, was never more marked than at present. In this connection it should be remembered, that, though the teaching force has been seriously decreased, the regular course of instruction according to the curriculum has been retained. The branches of study taught by the discharged professors, nearly all of which were of the highest importance, have in some cases been assigned to those who remain, and others have been continued by special in-

structors from abroad. In the latter cases the attempt has been successfully made to secure the services of proficient and experienced teachers in the departments to be taught. But, however advantageous this may be to the pupils, practically, it does not increase the Faculty, or divide with its members the care, labor, and responsibility of the general management of College affairs.

The anniversary exercises, instead of being held in the centre of the town, a mile from the College premises, as in most former years, were conducted in the College chapel, which, though of meager seating capacity, accommodated the different assemblies with little discomfort; this, with the fact that the musical associations of the students furnished all the music for the military parade and the indoor exercises, served to concentrate and unify the College sentiment, which apparently was shared alike by the College fraternity, friends, and visiting strangers. The exercises were attended by his Excellency the Governor, a large proportion of the Board of Trustees, the examining committee of the Board of Overseers, and a larger number than usual of citizen farmers from the surrounding community and different parts of the State; all of whom evinced great interest in the College and its work, and expressed satisfaction with the character of the exercises. After an address pregnant with good advice to the graduates, the Faculty, and Trustees, congratulations at the success of the institution, and pleasure at the spirit which appeared to pervade all, the Governor delivered the diplomas of the State to the members of the graduating class, conferring the degree of Bachelor of Science; and the diplomas of the Boston University were delivered by the College president.

The Grinnell prizes offered to the members of the graduating class for the two best written and oral examinations in agriculture, and the Farnsworth prizes to the sophomore and freshman classes for excellence in declamation, were sharply competed for, and great interest was manifested in each. But the importance of the former exercise is not fully appreciated, and does not attract the full attention of the public which its importance deserves. While the hope of winning the fifty or thirty dollar prize may stimulate the members of the class to excel, and temporarily

constitute the absorbing feature of the exercise, to the friends of the College and of agriculture it has a vastly more important phase. The topics selected for the examination are intended, as far as possible, to embrace the whole field of scientific agriculture, and the best modes of farm-practice in all its details. And their discussion is not only an exhibit of the culture and proficiency of the members of the class, but also of the correctness, the thoroughness, and the practicability of the instruction in this most important field of the College work. There is no better method for fault-finders and friends, to determine whether the instruction is fulfilling its mission, than by attending and participating in these annual examinations as examiners, as are all earnestly urged to do. In this examination the first prize was awarded to Almon H. Stone of Phillipston, and the second to William G. Lee of Amherst. The gold medals of the Farnsworth prizes were awarded to Samuel C. Damon of Lancaster, and David O. Nourse of Bolton; and the silver medals to John E. Wilder of Lancaster, and Homer J. Wheeler of Bolton. The Hills botanical prizes for the best general herbarium, and the best collection of native woods, were awarded, the first to Almon H. Stone of Phillipston, and the second to William C. Parker of Wakefield.

Professors Goodell, Goessmann, Graves, Maynard, and Morris have each conducted their departments with ability and a good measure of success, though all, but especially the physical department under the care of Professor Graves, are crippled by a deficiency of apparatus to make the instruction more clear and complete. The wants of the agricultural department are radical, and its equipment radically defective, and must remain so, until, by the acquisition of large means, the way is opened for the erection of commodious buildings, and the collection of illustrative material.

IMPROVEMENTS OF THE YEAR.

Great as are all the school wants which have been last enumerated, they have not been considered so immediately and economically pressing as the need of repairs to many of the buildings; some of which by thirteen years' use and exposure had taken on a neglected appearance, and suffered

a marked deterioration, and others were being injured by defects in the original structure: therefore, money saved from many sources has been expended in this direction.

The North College dormitory, which had settled in the centre, by the decay and "brooming" up of the post-pillars in the basement, has been lifted to its original position, and supported on granite blocks bedded down to hardpan. All the wood-work on this and the other brick dormitory has been thoroughly painted and sanded. The large laboratory chapel and drill-hall building, the dwelling-house until recently occupied by Professor Graves, the boarding-house, the botanic museum building, the plant-house, the old farmhouse occupied by the president, and the dwelling occupied by Professor Maynard, have all been well painted; and the latter structure has been improved by erecting an addition, which makes it much more commodious and convenient, as well as increases its attractiveness. These special repairs were made at a cost of nine hundred and fifty dollars. The whole work has materially improved the appearance of the estate, and contributed to the preservation of the property. By natural wear, and perhaps somewhat by carelessness of employés, the furniture of the kitchen and dining-room of the boarding-house had become so broken and marred as to be hardly serviceable or suitable for use. This has been replaced by new, at considerable expense; the establishment placed under the care of a competent matron who has succeeded in managing its affairs so as to preserve the College property, and make the house homelike and pleasant for the students.

The water-supply of the estate has never been in sufficient quantity, or of sufficient force, to be of any practical utility in the emergency of a fire, and recently, owing to the gradual filling-up of the reservoir with wash, and the decay of its log dam, has afforded a scant supply for ordinary use some months of the year; and, the Amherst Water Company having brought it from Pelham to the vicinity, a contract was made, for taking any quantity of it which was desired; for one hundred and fifty dollars a year. An eight-inch pipe has therefore been connected with their main and the reservoir-pipe, which gives an unlimited quantity to every part of the estate, and with sufficient head to throw it over the highest building, which gives such security that it should lessen the cost of fire insurance.

The distance from building to building, which the students are obliged to walk to their various exercises and to their meals, has always made the matter of walks of great consequence, and much pains has been taken to construct and keep them in repair with gravel. But in wet weather, and in the spring and fall, the sinking of the gravel to the clay has made them any thing but desirable, and a source of great annoyance in consequence of the mud which was unavoidably carried to the halls and rooms. To obviate the difficulty, a contract was made to supply gravel from the knoll south of the president's house, to construct tarred walks in the village, compensation being made by laying such walks around the College buildings. The amount of gravel thus taken has been sufficient to construct this year an eight-foot walk from South to North College and the laboratory, and from the main entrances of the buildings to the travelled road, thence over the worst ground to the boarding-house. They are found to be a source of great convenience, of cleanliness, and a marked improvement to the general appearance of the grounds.

COLLEGE FARM.

On the abolition of the office of farm superintendent, in consequence of straitened financial circumstances, its duties practically devolved upon the professor of agriculture. But the subsequent election of that officer to the presidency has made it utterly impossible for him to give a personal supervision to the details of farm work, or to have more than a general care of its business affairs. All details and much specific business has been committed to Mr. Henry Tillson as farm foreman, who with his family has occupied the farmhouse, and boarded the persons employed as teamsters. Mr. Tillson has taken great interest in his work, and discharged his delicate and arduous duties in the care of the farm, its labor, stock, crops, and general property, with gratifying success.

For the reasons above stated, Mr. John W. Clark, a graduate of the College, who for two or three years has been superintendent of the nurseries, has kindly assumed the care and management of the required farm work of students. Mr. Clark, who as a student had become familiar

with this exercise, has experienced no difficulty in the task, and has succeeded in maintaining the system in its usual efficiency.

Though the farm crops in certain cases have suffered somewhat for want of rain, they have been generally good, and of good quality. The following is the acreage and the crop yield of the past year, some of it given by estimation, but more by actual weight and measure: Corn, ten acres on the stump pasture, yield five hundred bushels shelled corn and twenty tons fodder; sugar-beets, three acres grown for the Franklin factory, yield thirty-six tons; potatoes, four acres on the light sandy loam west of the College buildings, yield five hundred bushels; oats, on land adjoining the pasture, twenty acres, yield one thousand bushels; rye, twelve acres on the light land north of the ravine, yield two hundred and fifty bushels; oat and rye straw, thirty-five tons; mowing land, seventy-five acres, yield of hay one hundred and fifty tons. The apple-crop of the farm was abundant, but of small market value, and was largely fed to cattle and swine, in both the raw and cooked state, and with marked beneficial results in both cases. The live stock has increased in number and value, the details of which will be found in the inventory of farm property annexed.

As a purely money-making and business affair, the year's operations on the farm have not been a success, though an analysis of the treasurer's report will show a deficiency of but from five to six hundred dollars. The management of the farm for this purpose never has been, and it is more than doubtful, if all the lands in their present condition are to be used for that purpose, if it ever can be. It may be said with truth, perhaps, that what the farm loses the institution gains; but that gives no brighter view of the farm balance as such. Though farm lands, with all their attachments, are absolutely essential as an illustration for a college of agriculture, and make a valuable return as do other educational appliances, yet their complication with school wants and affairs makes it difficult, if not impossible, to manage them on those strict business principles which are indispensable for profit. If the prime objects of connecting farm lands with the College are to give practical illustration

to school-room instruction, to give opportunity for experiments with soils, crops, and farm stock, to give students the privilege of learning something of farm labor, or to assist themselves to a limited extent by labor wages, it may be seriously considered whether they could not be as well or even better secured, with one hundred or one hundred and fifty acres of suitable variety and quality, as with four hundred in an unimproved condition, and whose improvement when attempted is practically a failure for want of sufficient means. If the income of the College, and the number of students, is permanently to remain as at present, it may be a matter worthy of thought, whether that portion of the large farm now held, which is not needed for school purposes and experiment, might not be sold at some opportune time, and the avails invested for the increase of the annual income.

HORTICULTURAL DEPARTMENT.

The horticultural and botanical department has been conducted by Professor Maynard with his usual skill and faithfulness. Its value for educational purposes, not only to the students of the College, but also to the general community, is every year becoming more apparent. While this is its chief value, the production and sale of choice varieties of plants, but especially of nursery stock, is highly appreciated, and the demand constantly increasing. The sales from this department during the year have amounted to the sum of \$2,792.76. For details respecting it, reference is made to the report of Professor Maynard annexed.

EXPERIMENT STATION.

The experiment station organized and put in operation at the College in the spring of 1878, on the basis of a meager private donation, not having been supported by public or private aid, and the officers upon whom devolved the responsibility of conducting it having been crowded with increased duties in other directions incident to the changes of the following year, has been necessarily suspended, so far as any systematic assigned work is concerned. The Sixteenth Annual Report contains a detailed account of the finished work, and of the investigations then in progress.

The experiments with sorghum as a sugar-producing plant

forever settled the fact, that no known variety of it can be profitably employed for that purpose, unless chemical science can discover a law by which glucose can be changed to cane sugar.

The experiments in feeding different kinds of fruit-bearing plants with special chemical elements, to improve the quantity and quality of their products, have been continued to date, and a synopsis of their progress may be found in the annexed report of Professor Goessmann on the condition of the chemical department. The investigations into the physical deportment of certain soils to temperature and water, and its influence on plant-growth, were continued in 1879, and to a limited extent in 1880. The rainfall in the former year, at the point where the lysimeter is located, during the months from April to November was 22.3 inches, which was equivalent to 608,430 gallons per acre. The percolation was 89.520 gallons per acre; or, of the rainfall, 14.71 per cent percolated, and 85.29 per cent evaporated. In the same months of 1880 the rainfall was 19.11 inches, equivalent to 543,620 gallons per acre. Of this, 4.75 per cent, or 25,800 gallons, percolated, and 95.25 per cent, or 517,820 gallons, evaporated. There was 64,810 gallons more water to the acre in 1879 than in 1880, but the percolation was more than three times as much in the former as in the latter year. The fall of rain in 1880 was generally small in each storm, evenly distributed, and with no percolation in four months of the six named. In 1879 the rainfall of single storms was very large, with more than a corresponding amount of percolation. In 1879 a record was kept of the temperature of dry gravel and wet peat soil in natural position, at the surface and five inches in depth, at 5 A.M. and 2.30 P.M., from April to October. The average temperature of the whole surface soil of five inches in depth, day and night for the whole time, was found to be, for gravel, 70.2° , and peat, 66.86° ; a result that corroborates and sustains the conclusions of the much smaller number of observations made in 1878, to which reference is made.

Early in the year a vacancy occurred in the Board of Trustees by the resignation of Hon. Richard Goodman of Lenox. It was filled at a meeting in June by the election of William Wheeler, B.S., of Concord, a graduate of the

College in the class of 1871. This election is an epoch in the College history, indicating its advancement in age, and bringing the experience and sympathy of the Alumni into connection with its active management, which must be to them a cause of pleasure and pride.

In 1879 a bequest of a thousand dollars to the College was received from the executors of Whiting Street of Northampton. The bequest did not specify any special purpose for which it should be used, and it was temporarily employed for contingent wants. But it has now been invested, and is to be known as the Whiting Street Fund. An examination of the treasurer's report will show, that, notwithstanding the special expenditure of nearly a thousand dollars in repairs, which cannot soon occur again, there is in his hands a balance to the credit of the College of \$1,238.01.

Respectfully submitted by order of the Trustees.

LEVI STOCKBRIDGE, *President.*

AGRICULTURAL COLLEGE, AMHERST,
Jan. 12, 1881.

THE CHEMICAL DEPARTMENT.

REPORT BY PROFESSOR CHARLES A. GOESSMANN.

THE entire course of instruction in theoretical and experimental chemistry during the past year has been given in accordance with the lately revised plan of studies. The change in transferring the branches of applied chemistry from the sophomore to the junior and senior year has proved very acceptable to both the students and the teacher. The attendance of all classes engaged in the various exercises of the department has been quite satisfactory, and their progress, on the whole, encouraging. The chemical laboratory is kept open five days during the week, four hours in the forenoon of each day, to accommodate all who wish to pursue a special course in practical chemistry. Several post-graduates have availed themselves of this opportunity during the past year; and quite a number of students of all classes have spent their spare hours in some practical laboratory work suited to their particular state of information, or related to their future special occupation. This course of action, judging from past experience, serves two purposes: it creates among the students a desirable interest in the study of chemistry, and aids essentially in procuring the pecuniary means to meet the unavoidable expenses of the department, as far as the regular instructions, specified in the College curriculum, necessitate. The expenses of the department have been kept, as in past years, within its income from the fees charged to those who take part in laboratory exercises.

Aside from the regular class duties, much time has been devoted to analytical chemical investigations in various directions. The examination of the commercial fertilizers offered for sale in our markets, as well as the composition of noted refuse materials recommended for fertilizing purposes, have received careful attention. The results of this work will be published, in conformity with our State laws for the regulation of the trade in "commercial fertilizers," through the

coming report of the Secretary of the State Board of Agriculture. The inquiry into the action of special fertilizers upon the quantity and the quality of fruit, mentioned already in a previous annual report, has been continued. Although some interesting facts have been noticed, it seems advisable to defer their publication, in the interest of a more complete presentation, to a future suitable occasion. Some active part has also been taken in securing desirable material for the examination of the chemical composition, and the comparative agricultural value of reputed fodder crops of Europe,—new to our farm industry. Forty varieties of seeds of forage plants, secured from a reliable seed-dealer in Germany, have been handed over for cultivation to the botanical department, where they receive a careful attention. In this connection, it gives me particular pleasure to state that I have enjoyed, throughout the entire course of my experimental field work, the hearty co-operation of Professor Maynard, to whose report I leave the task of describing the details of the latter.

REPORT OF BOTANIC DEPARTMENT.

BY PROFESSOR SAMUEL T. MAYNARD.

INSTRUCTION.

THE freshman and sophomore classes have been instructed in botany and drawing; the junior class in theoretical and practical horticulture; and the senior class in botany, microscopy, and landscape-gardening.

BOTANY.

The method pursued in the study of botany has been, first, to give the student a thorough knowledge of the structure of plants and the function of each part, using the microscope to show the actual appearance.

This is followed by the study of systematic botany, devoting most of the time to the study of the more common plants, such as weeds, grasses; and other useful plants. The one term with the senior class was devoted to systematic botany, giving particular attention to the characteristics of the different divisions, classes, and families, especially the injurious fungi and other cryptogamic plants, with the aid of the microscope.

HORTICULTURE.

In horticulture the limited time assigned was devoted to the most practical points in the cultivation of fruits, trees, shrubs and flowers, and the construction and care of greenhouses, pits, hot-beds and cold-frames, &c. It has been my aim to give each student actual practice, in the field and greenhouse, in every branch of the subject taken up in the class-room. In order to make this branch of instruction as valuable as it ought to be, more time should be allowed, as it is impossible to do justice to the large range of subjects that ought to be taken up, in one term of two hours each week. I would suggest that but four hours each week for

the summer and fall terms be devoted to class work, and that the two hours thus gained be employed in the instruction of horticulture.

MICROSCOPY.

The course of instruction consists in the study of the microscope itself, how to use it properly, and, at the same time, taking up a careful and systematic study of plant-tissue.

This enables the student to review the entire subject of the structure and uses of the various organs of plant-growth, while he is gaining knowledge of the manipulation and care of the microscope.

LANDSCAPE-GARDENING.

The time assigned to this subject was taken up in the study of the most important trees and shrubs used for ornamental purposes, together with the principles upon which are based the artistic arrangement of trees, shrubs, flowers, walks, lawns, buildings, &c.

DRAWING.

This work, although not directly in the line of botany or horticulture, was assigned to me, for want of better arrangements. The course with the freshman class has been, instruction in freehand drawing, giving most of the time, after the study of some of the elementary principles, to object-drawing. The sophomore class have received instruction in instrumental drawing, taking up such work as making plans of buildings from actual measurement, after the preliminary instruction in the care and use of the instruments. Both classes have made good progress, considering the limited time given to the elementary instruction.

GREENHOUSES AND FRAMES.

The Durfee Plant-House, while a very ornamental structure, and a good one in which to keep large specimens for instructional purposes, is not adapted to the use we are now obliged to make of it; i.e., the growing of plants for the trade.

The sash-bars and other parts of the structure are sadly in need of repairs and painting. Material has been cut for the

renewal of the walks and benches, and drawn to the mill for sawing.

To put this house and the new one in thorough repair, will require the expenditure of from three to five hundred dollars.

The lower wood-work outside of the large house, the sash of the new one, and between sixty and seventy of the cold-frame sash have been painted the past season.

This work was done wholly by students, as are all the repairs of glass, and many other things, which, in other departments, are done by assistance from outside.

CROPS.

The farm crops grown have been: corn, two acres; oats, one and a half acres; potatoes, one acre; peas, an eighth of an acre; squashes, three-quarters of an acre; early cabbages, half an acre; late cabbages, a quarter of an acre. About two and a half tons of hay has been cut and put into the barn in good condition, and about the same amount sold standing.

The fruit-crop has been above the average: peaches and grapes being very good; raspberries and blackberries, fair; and strawberries, light.

The sales of plants have been: larger than in previous years. The total sales of trees, plants, fruit, and vegetables, amount to \$2,796.72. Of this amount, \$630.27 are the sales of the nursery.

About three and a half acres of land north-east from the pear-orchard has been seeded down the past season, and one and a half acres south of the plant-house was turned over and reseeded. Three-quarters of an acre was planted with strawberries last spring, and the old plantation ploughed under, after the crop had been gathered. The new plantation bids fair to be the best piece we have ever had.

NURSERY.

About five acres are devoted to the growth of trees, shrubs, vines, &c., which are in a very flourishing condition, the sales the past year amounting to a little over six hundred dollars, with orders for the spring trade for nearly three hundred dollars more.

The sales, up to the present time, have been largely of

stock on hand at the time of starting the business, or which has been bought in to be resold.

After the present year, nearly every thing sold will be of our own growing.

Among the stock that is particularly fine, are about six thousand peach-trees one year from bud, several thousand apple-trees three years from root graft, with a good stock of vines, shrubs, small fruits, and a large and very complete stock of the various varieties of retinosporas and the more dwarf arbor-vitæs.

NEW PLANTS AND FRUITS.

Several of the new plants introduced by Col. Clark from Japan promise to be very valuable. Among them is the vigorous and hardy vine *Actinidia polygama*, and the beautiful deciduous tree *Cercidophyllum*. We are fortunate in having a good stock of the above, as well as of the noted umbrella-pine. The climbing hydrangea, which was introduced at the same time, is very slow in growth, and requires more time to prove whether it will be valuable or not. In the pear-orchard are several trees grafted with the promising new pears originated by Francis Dana, Esq., the stock of which was kindly sent us by Col. Stone of Dedham. The grafts have made a good growth, and will probably bear the coming season. The names of the varieties are President Clark, Francis Dana, Student, and Crumbs of Comfort.

As the first has been favorably mentioned by the committee of the Massachusetts Horticultural Society, I think it desirable to propagate a few of them for sale.

EXPERIMENTS.

In the pear-orchard, upon alternate rows, has been sown iron in two forms, to determine its effect upon the growth of the tree, and particularly upon the diseases to which they are liable. Upon the first row was sown Navassa phosphate, containing a large per cent of iron, about two pounds to each tree. Upon the second row was applied the same quantity of iron filings and sweepings from the blacksmith's shop. This course was continued through the orchard, and extended to the peach-trees and a few rows of vines in the vineyard.

In the peach-orchard experiments have been made for several years to determine the effect of severe pruning and an abundance of plant-food, particularly the chloride of potassa, upon the disease known as the "yellows." The results have been so marked, that we hope to be able to show that the disease is due to the exhausted condition of the soil and the injuries of the borer, and that a remedy is in the hands of every cultivator. In fact, every experiment we have made upon the various diseases attacking plant-life leads us to the conclusion that fungoid growths only attack living plants when they are in an unnatural or unhealthy condition.

A large collection of grasses and forage plants has been grown in plats twelve feet square, and each kind carefully labelled with both the Latin and common name, so that students and others can make a study of their characteristics.

It is proposed to make this collection as complete as possible by adding all the grasses and forage plants of any value that we can obtain.

A small plat of sugar-beets were grown from seed obtained by Dr. Goessmann from France and Germany.

Although the results were not as satisfactory as could be desired, it is hoped, by the application of special fertilizers, to produce a variety that will yield a larger per cent of sugar than any now grown in this country. A fine lot of seed was grown from a small lot of roots imported at the same time as the seed, which will serve as a basis for next year's experiment.

The experimental fruit-plats carried on for Dr. Goessmann are in a good growing condition.

From each of the five plats, strawberries of two varieties were gathered for analysis; and the coming season will yield raspberries, currants, gooseberries, and possibly grapes, from which something of the effects of the different fertilizers upon the character of the fruit may be determined.

Our knowledge of plant-life, and the effects of the different fertilizing elements upon their growth, must largely depend upon the work of the chemist; and no institution can boast of better facilities for original work than our own.

Upon the east side of the above plats, it is proposed to devote a narrow strip of land to the growth of the newer small fruits.

IMPROVEMENTS.

A border of trees and shrubs was planted last spring, beginning near the new propagating house, and extending south of the large houses and a short distance along the main road toward the village. These have made a good growth, and, in a year or two, will add much to the beauty of the place. The willow hedge above the large house having become a nuisance, as a harbor for insects and vermin, and by the exhaustion of the soil upon either side, has been pulled out by the roots, and burned, and the space devoted to the growth of pear-seedlings.

It is proposed to obtain the desired wind-break by planting a row of hemlocks and spruces along the north side of the road leading to Col. Clark's.

LABOR.

The labor of the department the past year has been nearly all done by students; and, while it may not be as profitable as if done by more regular help, yet there is great pleasure in having the work done by young men who desire to learn, and who are faithful and intelligent in the discharge of their duties.

The main difficulty in the way of the successful employment of students' labor is in our inability to arrange for their irregular work.

This requires a thorough equipment and some skilled labor to assist in the preparation.



CATALOGUE

OF

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

1880.

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

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BENJAMIN K. EMERSON, PH.D.,

Lecturer on Geology.

JOHN M. TYLER, M.A.,

Lecturer on Zoölogy and Entomology.

JOHN W. CLARK, B.S.,

Superintendent of Nurseries.

Graduates of 1880.*

Fowler, Alvan Luther	Westfield.
Gladwin, Frederic Eugene	Westfield.
Lee, William Gilbert	Amherst.
McQueen, Charles Manjie	Longmeadow.
Parker, William Colvard (Boston Univ.),	Wakefield.
Ripley, George Arms	Worcester.
Stone, Almon Humphrey	Phillipston.
Total	7

Senior Class.

Bowman, Charles Abel (Boston Univ.)	Billerica.
Boynton, Charles Enoch	Groveland.
Carr, Walter Frank	Clinton.
Chapin, Henry Edgerton	Springfield.
Fairfield, Frank Hamilton (Boston Univ.),	Waltham.
Flint, Charles Louis, jun. (Boston Univ.),	Boston.
Hashiguchi, Boonzo (Boston Univ.)	Tokio, Japan.
Hills, Joseph Lawrence (Boston Univ.),	Boston.
Howe, Elmer Dwight	Marlborough.
Perry, Alfred Dwight	Worcester.
Peters, Austin (Boston Univ.)	Boston.
Rawson, Edward Briggs	Brooklyn, N.Y.
Sattler, Hermann Charles	Baltimore, Md.
Smith, Hiram Fred Markley	North Hadley.
Spalding, Abel Walter (Boston Univ.)	Billerica.
Taylor, Frederic Patterson (Bost. Univ.),	Boston.
Warner, Clarence Duane (Boston Univ.),	Granby.
Whittaker, Arthur	Needham.
Wilcox, Henry Harrison	Nawiliwili, S.I.
Total	19

Junior Class.

Allen, Francis Sherwin	Medfield.
Allen, George Dickinson	Amherst,
Aplin, George Thomas	East Putney, Vt.

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the College during any portion of the year 1880.

Beach, Charles Edward	Hartford, Conn.
Bingham, Eugene Percival	Fitchburg.
Bishop, William Herbert	Diamond Hill, R.I.
Brodt, Harry Snowden	Dansville, N.Y.
Chandler, Everett Sawyer	Coldwater, Mich.
Chipman, Frank Ellsworth	Beverly.
Cooper, James Willard	East Bridgewater.
Cutter, John Ashburton	New-York City.
Damon, Samuel Chester	Lancaster.
Floyd, Charles Walter	Boston.
Goodale, David	Marlborough.
Hillman, Charles Dexter	Hardwick.
Holmes, Samuel Judd	Montclair, N.J.
Howard, Joseph Henry	Hyannis.
Howe, George Dickinson	North Hadley.
Jones, Frank Waldo	South Scituate.
Jones, Nathaniel Nelson	Georgetown.
Joyner, Frank Hall	North Egremont.
Kingman, Morris Bird	Amherst.
Kinney, Burton Arial	Lowell.
Knowles, William Fletcher, jun.	North Cambridge.
May, Frederick Goddard	Boston.
Morse, William Austin	Boston.
Myrick, Herbert	Concord.
Paige, James Breckenridge	Prescott.
Perkins, Charles Brookhouse	Salem.
Perkins, Dana Edson	Wakefield.
Platt, John Cheney	New-York City.
Plumb, Charles Sumner	Westfield.
Putnam, Henry Anderson	Worcester.
Shiverick, Asa Frank	Woods Holl.
Stone, Winthrop Ellsworth	Amherst.
Taft, Levi Rawson	Mendon.
Taylor, Alfred Howland	Yarmouthport.
Thurston, Wilbur Herbert	Upton.
Wheeler, Henry Lewis	Great Barrington.
Wheeloock, Victor Lamont	North Amherst.
Wilder, John Emery	Lancaster.
Williams, James Stoddard	Glastonbury, Conn.
Wilmarth, Frederick Augustus	Upton.
Windsor, Joseph Libbey	Grafton.
Total	44

Sophomore Class.

Bagley, Sydney Currier	Boston.
Bishop, Edgar Allen	Diamond Hill, R.I.
Chaplin, John Dorr Hayward	East Bridgewater.
Conger, Charles Thompson	New-York City.
Fletcher, Frank Howard	Townsend.
Hevia, Alfred Armand	Havana, Cuba.
Lindsey, Joseph Bridgeo	Marblehead.
Manton, William James	Lime Rock, R.I.
Minott, Charles Walter	Westminster.
Nourse, David Oliver	Bolton.
Owen Henry Willard	Amherst.
Preston, Charles Henry	Danvers.
Selden, John Lincoln	Ashfield.
Smith, William Edward	Sheffield.
Tryon, Charles Osmer	S. Glastonbury, Conn.
Wheeler, Homer Jay	Bolton.
Total	16

Freshman Class.

Braune, Domingos Henrique	Nova Friburgo, Brazil.
Brown, Henry Clinton	Pittsfield.
Dickinson, Howard Wilmot	Amherst.
Dwight, Edwin Wells	Pittsfield.
Goessman, Henry Edward Victor	Amherst.
Herms, Charles	Louisville, Ky.
Holland, Harry Dickinson	Amherst.
Jones, Elisha Adams	Rockville.
Lublin, Alfred William	New-York City.
Mayo, Walter Parker	Wellesley.
Redding, Merton Jay	Amherst.
Smith, Llewellyn	Amherst.
Smith, William Henderson	Amherst.
Smith, William Ratcliffe	Amherst.
Total	14

Select Class.

Casparian, Gregory	Nicomedia, Turkey.
Chandler, Willard Mayne	South Natick.

Clay, Cassius Morey	Westminster, Vt.
Cochran, Robert Armstrong, jun.	Maysville, Ky.
Cutler, George, jun.	Amherst.
Davis, Arthur Emmons	Amherst.
Fish, Charles Sumner	Boston.
Holman, Samuel Morey	Attleborough.
Jackson, Andrew	San Francisco, Cal.
Johnson, Frank Prescott	Waltham.
Jones, Edward Spaulding	Worcester.
Kenfield, Charles Robert	Amherst.
Smith, Benjamin Salter	New-York City.
Total	13

Post-Graduates.

Clark, B.S., Atherton (Boston Univ.) . .	Amherst.
Lovell, M.A., Henry Lyman (Amherst College)	Amherst.
Parker, B.S., William Colvard (Boston Univ.)	Wakefield.
Stockbridge, B.S., Horace Edward (Bos- ton Univ.)	Amherst.
Stone, B.S., Almon Humphrey	Phillipston.
Total	5

Summary.

Post-Graduates	5
Graduates of 1880	7
Senior Class	19
Junior Class	44
Sophomore Class	16
Freshman Class	14
Select Class	13
Total	118

GRADUATES.

- Allen, Gideon H., '71, Winfield, Cowley Co., Kan., Agent, Adams Express Co.
- Bagley, David A., '76, Winchendon, Farmer.
- Baker, David E., '78, Franklin, Student, Harvard Medical School.
- Barrett, Joseph F., '75, 3 Park Place, New-York City, Salesman, Bowker Fertilizer Co.
- Barri, John A., '75, 65 Austin St., Cambridgeport, Student.
- Bassett, Andrew L. '71, New-York City, Clerk, Vermont C. R.R. & Steamship Co.
- Bell, Burleigh C., '72, 113 Third St., San Francisco, Cal., Druggist.
- Bellamy, John, '76, 659 Washington St., Boston, Nichols, Bellamy & Co.
- Benedict, John M., '74, 3 Park Place, New-York City, Bowker Fertilizer Co.
- Benson, David H., '77, 3 Park Place, New-York City, Chemist and Superintendent, Works, Bowker Fertilizer Co. at Elizabethport, N.J.
- Birnie, William P., '71, Springfield, Conductor, Conn. Central R.R.
- Blanchard, William H., '74, Westminster, Vt., Farmer.
- Boutwell, Willie L., '78, Leverett, Farmer.
- Bowker, William H., '71, 43 Chatham St., Boston, President, Bowker Fertilizer Co.
- Bragg, Everett B., '75, 3 Park Place, New-York City, Manager New-York Office, Bowker Fertilizer Co.
- Brett, William F., '72, Brockton, Clerk, B. H. White & Co., Boston.
- Brewer, Charles, '77, Pelham, Farmer.
- Brigham, Arthur A., '78, Marlborough, Farmer.
- Brooks, William P., '75, Sapporo, Japan, Professor of Agriculture and Farm Superintendent, Japan Agricultural College.
- Bunker, Madison, '75, New-York City, Student, American Veterinary College.
- Callender, Thomas R. '75, Grantville, Florist.

- Campbell, Frederick G., '75, West Westminster, Vt., Farmer.
Caswell, Lilley B., '71, Athol, Civil Engineer and Farmer.
Chandler, Edward P., '74, Abilene, Kan., Farmer.
Chickering, Darius O., '76, Enfield, Farmer.
Choate, Edward C., '78, Southborough, Farmer.
Clark, Atherton, '77, Georgetown, El Dorado Co., Cal., Miner.
Clark, John W., '72, Amherst, Superintendent of Nurseries, Agricultural College.
Clark, Xenos Y., '78, Baltimore, Md., Fellow, John Hopkins University.
*Clay, Jabez W., '75.
Coburn, Charles F., '78, Lowell, Teller, Five Cents Savings Bank, and Paragrapher, "Daily Citizen."
Cowles, Frank C., '72, Amherst, Farmer.
Cowles, Homer L., '71, Hadley, Farmer.
†Curtis, Wolfred F., '74.
Cutter, John C., '72, Sapporo, Japan, Professor of Natural Science, Japan Agricultural College.
Deuel, Charles F., '76, Amherst, Druggist.
Dickinson, Richard S., '79, Odell, Livingston Co., Ill., Farmer.
Dodge, George R., '75, Brighton, Foreman, Works, Bowker Fertilizer Co.
Dyer, Edward N., '72, Kohala, S.I., Teacher.
Easterbrook, Isaac H., '72, Diamond Hill, R.I., Farmer.
Eldred, Frederick C., '73, 119 Chambers St., New-York City, Salesman, D. W. Wilson & Bro.
Ellsworth, Emory A., '71, Holyoke, Architect, Civil and Mechanical Engineer with D. H. & A. B. Tower.
Fisher, Jabez F., '71, Fitchburg, Local Freight Agent, Fitchburg Railroad.
Fiske, Edward R., '72, Philadelphia, Penn., Merchant, Folwell, Bro. & Co., 629 Chestnut St.
Flagg, Charles O., '72, Diamond Hill, R.I., Farmer.
Foote, Sanford D., '78, Springfield, Hampden Watch Co.
Fowler, Alvan L., '80, Westfield, Clerk and Paymaster, Smith & Ripley.
Fuller, George E., '71.
Gladwin, Frederic E., '80, Westfield, Surveyor.
Green, Samuel B., '79, Amherst, Post-Graduate, Agricultural College.
Grover, Richard B., '72, Andover, Student, Theological Seminary.

* Died Oct. 1, 1880, of pneumonia, at New-York City.

† Died Nov. 8, 1878, of inflammation of the brain, at Westminster.

- Guild, George W. M., '76, New-York City, employ of Adams Express Company.
- Hague, Henry, '75, Manville, R.I., Clergyman.
- Hall, Josiah N., '78, Revere, Student, Harvard Medical School.
- Harwood, Peter M., '75, Barre, Farmer.
- Hawley, Frank W., '71, Hadley, Farmer.
- Hawley, Joseph M., '76, Berlin, Wis., Banker, C. A. Mather & Co.
- Herrick, Frederick St. C., '71, Methuen, Farmer.
- Hibbard, Joseph R., '7/, Stoughton, Wis., Farmer.
- Hitchcock, Daniel G., '74, Warren, Merchant.
- Hobbs, John A., '74, Bloomington, Neb., Farmer.
- Holmes, Lemuel Le B., '72, Mattapoisett, Lawyer.
- Howe, Charles S., '78, Albuquerque, N.M., Principal, Albuquerque Academy.
- Howe, Waldo V., '77, Framingham, Superintendent, Framingham Brick Co.
- Hubbard, Henry F., '78, New Rochelle, N.Y., Surveyor.
- Hunt, John F., '78, Atascosa, Baxar Co., Texas, Surveyor.
- Kendall, Hiram, '76, Providence, R.I., Chemist and Superintendent, Kendall Manufacturing Co.
- Kimball, Francis E., '72, Worcester, Clerk, B. B. & G. R.R.
- Knapp, Walter H., '75, Grantville, Florist.
- Koch, Henry G. H., '78, Sixth Avenue and Twentieth St., New-York City, H. C. F. Koch & Son.
- Ladd, Thomas H., '76, care Wm. Dadmun, Watertown, Student.
- Lee, Lauren K., '75, Des Moines, Ia., Agent, Kellogg & McDougal, Buffalo Linseed Oil Works.
- Lee, William G., '80, Georgetown, El Dorado Co., Cal., Miner.
- Leland, Walter S., '73, Concord, Officer, State Prison.
- Leonard, George, '71, Springfield, Lawyer.
- Libby, Edgar H., '74, Agricultural Journalist.
- Livermore, Russell W., '72, 9 and 11 Chamber of Commerce, Toledo, O., Attorney-at-Law.
- Lovell, Charles O., '78, Rutland, Vt., with A. D. Perkins, Photographer.
- Lyman, Ashael H., '73, Manistee, Mich., Druggist and Bookseller.
- Lyman, Charles E., '78, Middlefield, Conn., Farmer.
- *Lyman, Henry, '74.
- Lyman, Robert W., '71, Belchertown, Lawyer.
- Mackie, George, '72, Attleborough, Physician.
- Macleod, William A., '76, 60 Devonshire St., Boston, Lawyer, with J. E. Maynadier.

* Died Jan. 8, 1879, of pneumonia, at Middlefield, Conn.

- Mann, George H., '76, Sharon, Manufacturer.
Martin, William E., '76, Excelsior, Minn., Clerk.
Maynard, Samuel T., '72, Amherst, Professor of Botany and Horticulture, Massachusetts Agricultural College.
McConnel, Charles W., '76, Lonsdale, R.I., Dentist.
McQueen, Charles M., '80, Longmeadow, Nursery Agent.
Miles, George M., '75, Miles City, Montana, U. S. Commissioner of Courts, and engaged in sheep-raising.
Mills, George W., '73, Medford, Physician.
Minor, John B., '73, New Britain, Conn., Clerk, Russell & Erwin Manufacturing Co.
Montague, Arthur H., '74, South Hadley, Farmer.
Morey, Herbert E., '72, 49 Haverhill St., Boston, Merchant, Morey, Smith & Co.
Morse, James H., '71, 251 Essex St., Salem, Civil Engineer.
Myrick, Lockwood, '78, Tremont Bank Building, State St., Boston, Clerk, Soluble Pacific Guano Co.
Nichols, Lewis A., '71, Santa Fé, New Mexico, Civil Engineer.
Norcross, Arthur D., '71, Monson, Postmaster.
Nye, George E., '77, 70 Exchange Building, Union Stock Yards, Chicago, Ill., Bookkeeper, G. L. Swift.
Osgood, Frederick H., '78, 10 Albany St., Edinburgh, Scotland, Veterinary Student.
Otis, Harry P., '75, Leeds, Superintendent, Northampton Emery Wheel Co.
Page, Joel B., '71, Conway, Farmer.
Parker, George A., '76, Poughkeepsie, N.Y., Gardener, Vassar College.
Parker, George L., '76, Dorchester, Florist.
Parker, Henry F., '77, 229 Broadway, New-York City, Draughtsman, A. V. Briesen.
Parker, William C., '80, Wakefield, Farmer.
Peabody, William R., '72, Atchison, Kan., General Agent, Atchison, Topeka, & Santa Fé Railroad.
Penhallow, David P., '73, Europe, Student.
Phelps, Charles H., '76, South Framingham, Florist.
Phelps, Henry L., '74, Northampton, Dealer in Fertilizers.
Porter, William H., '76, Hatfield, Farmer.
Porto, Raymundo M. da S., '77, Para, Brazil, Planter.
Potter, William S., '76, Lafayette, Ind., Lawyer, firm of W. De Witt Wallace.
Renshaw, James B., '73, Hutchinson, Minn., Clergyman.
Rice, Frank H., '75, Aurora, Nev., Clerk.

- Richmond, Samuel H., '71, 245 Broadway, New-York City, Correspondent Branch Office, Chicago Medical Record.
- Ripley, George A., '80, Lincoln House, Worcester, no business.
- Root, Joseph E., '76, Barre, Student of Medicine, New-York City.
- Rudolph, Charles, '79.
- Russell, William D., '71, Turner's Falls, Chemist, Montague Paper Company.
- Salisbury, Frank B., '72, Kimberley Diamond Fields, South Africa, Clerk.
- Sears, John M., '76, Ashfield, Farmer.
- Shaw, Elliot D., '72, Holyoke, Florist.
- Sherman, Walter A., '79, 141 West Fifty-fourth St., New-York City, Student, American Veterinary College.
- Simpson, Henry B., '73, Centreville, Md., Farmer.
- Smead, Edwin, '71, 129 Camden St., Baltimore, Md., Dealer in Scrap Iron.
- Smith, Frank S., '74, Hampden, Woollen Manufacturer.
- Smith, George P., '79, Sunderland, Farmer.
- Smith, Thomas E., '76, West Chesterfield, Manufacturer.
- Snow, George H., '72, Leominster, Farmer.
- Somers, Frederick M., '72, San Francisco, Cal., Editor, "Argonaut."
- *Southmayd, John E., '77.
- Southwick, Andre A., '75, Talladega, Ala., Instructor in Agriculture, Talladega College.
- Sparrow, Lewis A., '71, 43 Chatham St., Boston, Chemist, Bowker Fertilizer Co.
- Spofford, Amos L., '78, Georgetown, Shoe-cutter.
- Stockbridge, Horace E., '78, Amherst, Post-Graduate, Agricultural College.
- Stone, Almon H., '80, Amherst, Post-Graduate, Agricultural College.
- Strickland, George P., '71, Stillwater, Minn., Machinist, Seymour, Sabin & Co.
- Swan, Roscoe W., '79, Framingham, Student, Harvard Medical School.
- Taft, Cyrus A., '76, Whitinsville, Machinist.
- Thompson, Edgar E., '71, East Weymouth, Teacher.
- Thompson, Samuel C., '72, Natick, Civil Engineer.
- Tucker, George H., '71, Grandin Farm, Dakota, Farmer.
- Tuckerman, Frederick, '78, Dedham, Student, Harvard Medical School.

* Died Dec. 11, 1878, of consumption, at Minneapolis, Minn.

- Urner, George P., '76, 116 Franklin St., New-York City,
Superintendent Magic Ruffle Company.
- Wakefield, Albert T., '73, Peoria, Ill., Physician.
- Waldron, Hiram E. B., '79, North Rochester, Farmer.
- Ware, Willard C., '71, 255 Middle St., Portland, Me., Manager,
Boston & Portland Clothing Company.
- Warner, Seth S., '73, Florence, Farmer.
- Washburn, John H., '78, Providence, R.I., Teacher, State Reform
School, and Student, Brown University.
- Webb, James H., '73, New Haven, Conn., Attorney-at-Law.
- Wellington, Charles, '73, Washington, D.C., Chemist, United
States Agricultural Department.
- Wells, Henry, '72, Rochester, N.Y., Clerk, "Blue Line," Fast-
Freight Office.
- Wetmore, Howard G., '76, 3 East Seventeenth St., New-York
City, Physician.
- Wheeler, William, '71, Concord, Civil Engineer and Inventor.
- Whitney, Frank Le P., '71.
- Whitney, William C., '72, Minneapolis, Minn., Architect.
- Williams, John E., '76, Amherst, Editor, "Record."
- Winchester, John F., '75, Lawrence, Veterinary Surgeon and
Lecturer, Massachusetts Agricultural College.
- Wood, Frank W., '73, Providence, R.I., Civil Engineer.
- Woodbury, Rufus P., '78, Elk Falls, Howard Co., Kan., Druggist
and News-dealer.
- Woodman, Edward E., '74, Danvers, Florist, E. & C. Woodman.
- Wyman, Joseph, '77, Arlington, Farmer.
- Zeller, Harrie McK., '74, Hagerstown, Md., Agent, Singer Sewing
Machine Company.

COURSE OF STUDY AND TRAINING.

FRESHMAN YEAR.

First Term.—Chemistry, 3 hours each week ; Human Anatomy, Physiology, and Hygiene, 3 hours ; Algebra, 5 hours ; English, 2 hours ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Manual Labor, 6 hours.

Second Term.—Inorganic Chemistry, 3 hours ; Botany, 3 hours ; Geometry, 5 hours ; Agriculture, 3 hours ; English, 2 hours ; Elocution, 1 hour ; Freehand Drawing, 3 hours ; Military Drill, 3 hours.

Third Term.—Systematic Botany, 4 hours ; Geometry, 4 hours ; French, 5 hours ; Elocution, 2 hours ; Agriculture, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SOPHOMORE YEAR.

First Term.—Systematic Botany, 3 hours each week ; Geometry, 4 hours ; French, 5 hours ; English, 1 hour ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Manual Labor, 6 hours.

Second Term.—Geology, 3 hours ; Trigonometry, 5 hours ; French, 4 hours ; English, 1 hour ; Agriculture, 3 hours ; Declamation, 1 hour ; Drawing, 3 hours ; Military Drill, 3 hours.

Third Term.—Zoölogy, 5 hours ; Surveying, 5 hours ; Agriculture, 2 hours ; English, 3 hours ; Declamation, 1 hour ; Leveling, 3 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

JUNIOR YEAR.

First Term.—German, 5 hours each week ; Mechanics, 5 hours ; Entomology, 2 hours ; Market-Gardening, 2 hours ; Horticulture, 2 hours ; Military Drill, 3 hours ; Manual Labor, 6 hours.

Second Term.—German, 4 hours ; Physics, 5 hours ; Practical Chemistry, 9 hours ; Drawing, 3 hours ; Agricultural Debate, 1 hour ; Declamation, 1 hour ; Military Drill, 3 hours.

Third Term.—German, 4 hours ; Astronomy, 4 hours ; Practical

Chemistry, 9 hours ; Declamation, 1 hour ; Stock and Dairy Farming, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SENIOR YEAR.

First Term. — English Literature, 4 hours each week ; Practical Chemistry, 7 hours ; Book-keeping, 2 hours ; Roads and Railroads, 3 hours ; Military Science, 2 hours ; Original Declamation, 1 hour ; Military Drill, 3 hours.

Second Term. — English Literature, 4 hours ; Theses, 1 hour ; Mental Science, 4 hours ; Agriculture, 2 hours ; Veterinary Science, 3 hours ; Military Science, 2 hours ; Microscopy, 4 hours ; Military Drill, 3 hours.

Third Term. — Veterinary Science, 2 hours ; Military Science, 2 hours ; Botany, 3 hours ; Landscape-Gardening, 3 hours ; Rural Law, 1 hour ; Lectures on English Language, 2 hours ; Theses, 1 hour ; Agricultural Review, 4 hours ; Military Drill, 4 hours.

CALENDAR FOR 1881.

The third term of the collegiate year begins March 24, and continues till June 22.

The first term begins Aug. 25, and continues till Nov. 23.

The second term begins Dec. 8, and continues till March 8, 1882.

There will be an examination of candidates for admission to the College, at the Botanic Museum, at 9 A.M., Tuesday, June 21, and also on Thursday, Aug. 25.

The Farnsworth Prize Declamations take place Monday evening, June 20.

The public examination of the graduating class for the Grinnell Prize for excellence in agriculture, and the examination of the other classes in the studies of the term, will take place on Tuesday forenoon, June 21.

The exercises of Graduation Day occur June 22.

ADMISSION.

Candidates for admission to the Freshman Class are examined, orally and in writing, upon the following subjects : English Grammar, Geography, Arithmetic, Algebra through simple equations, and the History of the United States.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the College until he is fifteen years of age; and every student is required to furnish a certificate of good character from his late pastor or teacher, and to give security for the prompt payment of term-bills. Tuition and room-rent must be paid in advance at the beginning of each term; and bills for board, fuel, &c., at the end of every term.

The regular examinations for admission are held at the Botanic Museum, at nine o'clock A.M., Tuesday, June 21, and on Thursday, Aug. 25; but candidates may be examined and admitted at any other time in the year.

EXPENSES.

Tuition	\$12 00 per term.
Room-rent	5 00 to 10 00 "
Board	2 50 to 3 50 per week.
Expenses of chemical laboratory to students of practical chemistry	10 00 per term.
Public and private damages, including value of chemical apparatus destroyed or injured . . .	At cost.
Annual expenses, including books	\$250 00 to 350 00

REMARKS.

The regular course of study occupies four years; and those who complete it receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the College may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the College, thereby becoming entitled to all the privileges of its alumni.

The instruction in the languages is intended to qualify the graduates to write and speak English with correctness and effect, and to translate French with facility. The scientific course is as thorough and practical as possible; and every science is taught with constant reference to its application to agriculture and the wants of the farmer.

The instruction in agriculture and horticulture includes every branch of farming and gardening which is practised in Massachusetts, and is both theoretical and practical. Each topic is discussed thoroughly in the lecture-room, and again in the plant-house or field, where every student is obliged to labor. The amount of required work, however, is limited to six hours per week in order that it may not interfere with study. Students are allowed to do additional work for wages, provided they maintain the necessary rank as scholars.

Indigent students are allowed to do such work as may offer about the College or farm buildings, or in the field; but it is hardly possible for one to earn more than from fifty to one hundred dollars per annum, besides performing other duties. So far as is consistent with circumstances, students will be permitted to select such varieties of labor as they may, for special reasons, desire to engage in.

Those who pursue a select course attend recitations and lectures with the regular classes; but those properly qualified, who desire special instruction in botany, chemistry, civil engineering, veterinary science, agriculture, or horticulture, may make private arrangements with the officers having charge of these departments.

An expenditure of from ten to fifty dollars is necessary to provide furniture, which may be purchased at reasonable rates, either new or second-hand. At the beginning of the second term of attendance each student is required to provide himself with the full uniform prescribed for the battalion of Agricultural Cadets, the cost of which is about thirty dollars.

On Sundays students are required to attend church in the forenoon, and invited to join a class for the study of the Bible in the afternoon. They will be permitted to select their place of attendance from among the churches in the town, of the following denominations: viz., Baptist, Congregational, Protestant Episcopal, Methodist Episcopal, and Roman Catholic.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the College or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the faculty in their respective departments.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The library of the College contains about two thousand volumes. Among them are several sets of cyclopædias, magazines, and newspapers, reports of agricultural societies and State boards of agriculture, and many standard works on agriculture and horticulture. There are also many useful works of reference in chemistry, botany, surveying, and drawing.

The Faculty and students also have the privilege of drawing books from the excellent library of Amherst College, which contains over thirty thousand volumes.

The State cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the College, and is of much value for purposes of instruction.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods, and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About fifteen hundred species and varieties of plants are cultivated in the Durfee Plant-House, affording much pleasure and information to students and visitors.

The class in microscopy has the use of seven of Tolles' best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

PRIZES.

FARNSWORTH RHETORICAL MEDALS.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, which is to be used for the purchase of gold and silver medals, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Claflin of Boston has given the sum of one thousand dollars for the endowment of a first prize of fifty dollars, and a second prize of thirty dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members

of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILLS BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1880, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

REGULATIONS.

I.—Students are forbidden to combine for the purpose of absenting themselves from any required exercise, or violating any known regulation of the College.

II.—The roll shall be called, five minutes after the ringing of the bell for each exercise of the College, by the officer in charge, unless a monitor be employed; and students who do not answer to their names will be marked absent, provided that any student coming in after his name has been called shall be marked tardy. Two tardinesses shall be reckoned as one absence.

III.—Absence from a single exercise may be allowed or excused by the officer in charge of the same, if requested beforehand; but permission to be absent from several exercises must be obtained in advance from the general excusing officer, or from the president. In such cases the officer excusing will furnish a certificate of excuse, which shall state the precise time for which absence is permitted, and which shall be a satisfactory reason for absence from all exercises occurring within the time specified.

IV.—Excuses for all absences, whether with permission obtained beforehand or not, must be submitted to the excusing committee. They must be rendered promptly within one week from the date of absence; and those deemed unsatisfactory will be returned to the student with the indorsement of the committee.

V.—Whenever the aggregate number of unexcused absences in all departments reaches five, the student so delinquent shall be informed of the fact. When the number of such absences reaches eight, the parent or guardian of the student shall be informed of his delinquency; and, when ten such delinquencies are justly recorded against any student, his connection with the College may be terminated.

VI.—Students are forbidden to absent themselves without ex-

cuse from the regular examinations, to give up any study without permission from the president, or to remove from one room to another without authority from the officer in charge of the dormitory buildings; and no student shall be permitted to make such change until he has procured from the inspecting officer a written statement that the room about to be vacated is in perfect order.

VII.—Students shall be required to attend the church of their selection regularly on Sunday morning; and report in writing to the excusing officer, during the ensuing week, whether they attended or not.

VIII.—The record of deportment, scholarship, and attendance, will be carefully kept; and, whenever the average rank of a student falls below fifty, he will not be allowed to remain a member of the College, except by a special vote of the Faculty. Admission to the College, and promotion from class to class, as well as to graduation, are granted only by vote of the Faculty.

IX.—Students are required to abstain from any thing injurious to the buildings and other property of the College, and in all respects to conduct themselves with propriety.

X.—Parents and guardians are specially urged to co-operate with the Faculty in securing the faithful attendance of students upon every appointed exercise of the College.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given: In the south dormitory the main corner-rooms are fifteen by eighteen feet, and the adjoining bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner-rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

SCHOLARSHIPS.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

The Trustees voted in January, 1878, to establish one free

scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution; and should enter College with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture. To every such student the cash value of a scholarship is one hundred and forty-four dollars.

REPORT OF THE BOARD OF OVERSEERS.

THE committee appointed by the State Board of Agriculture to examine the Agricultural College ask leave to submit the following report:—

We assume that the Board desires something more than a mere report of the graduating exercises of the students, and with that view we have carefully examined other departments and the working of the College.

The members of this committee have visited the institution at various times the last year; and some of us have watched its progress from the time it was founded, to the present time, with a great deal of interest.

The Act of Congress passed in the year 1862, donating public lands for the purpose of founding colleges to benefit agriculture and the mechanic arts, was a noble act; and it will live in history as a monument of the wisdom of our government, which, in the dark days of the war, had the foresight to encourage that great interest lying at the foundation of all national prosperity, and in comparison to which any other interest sinks into insignificance, and the product of which is to-day paying the national debt.

In 1863 the State of Massachusetts accepted the offer of the United States, and incorporated the Massachusetts Agricultural College, and, with its proverbial liberality, has given it, at different times, between two and three hundred thousand dollars.

All new enterprises cost more than well-settled projects: the Hoosac Tunnel cost the State some twenty millions of dollars, and, as an engineer has said, fifteen millions to find out how, and five millions to make it. Like all new enterprises, it costs more to find out how, than it does to do it: our College is not an exception to this rule.

The establishment of an institution for the purpose of teaching practical, and we may also say theoretical, agriculture,

was an experiment in this country. There were no trained instructors who could teach the art of producing crops in the greatest perfection, nor the natural sciences relating to the animal or vegetable kingdom, the true knowledge of causes and effects, and the laws of nature, which, we may say, is science applied to agriculture.

All these difficulties we have had to contend with. Is it any wonder, then, that mistakes have been made? And these mistakes have not been in the College itself; but, like the tunnel, it has been in developing how the best work can be done.

FARM.

We found last June that the fields of grass were looking in a fair condition, and the corn about the same, and that there was about the usual amount of each harvested in their season. The means at the disposal of the Trustees of the College are so limited, that they are unable to make the improvements on the farm which would exhibit to the farmers of Massachusetts those evidences of improved and progressive agriculture which they would have a right to expect on a model farm of the State.

The policy adopted by the Trustees in the year 1880, in regard to the farm, was to sell the hay, and also a part of the stock. This course reduces the quantity of manure to be applied to the land, and therefore necessarily impairs its power of production of future crops, unless an equivalent be returned in some form to the soil, which, we are informed, has not been done. A long continuance of cropping without manure means sterility.

We do not mean to censure any one for this: the circumstances in which the finances of the College were unfortunately found may have rendered it necessary to pursue the course which was adopted; neither should we expect the farm to pay, as it is termed. A student in chemistry, to acquire even a small amount of knowledge, has to work out under his teacher his problems in the laboratory, which must be thoroughly equipped so as to give the best instruction. Why? Theoretical chemistry seldom makes a chemist; theoretical farming never makes a farmer. The student—after receiving the theoretical knowledge as to raising crops, and the management of every thing pertaining to the farm,

which, we think, is well taught here — should be required, as a part of his course of studies, to do all the operations required on the farm, so that he may fully understand practically, as well as theoretically, what farming means, to the end that he may make a farmer that will be competent to instruct in that branch in any institution, or by his example on a farm to elevate and adorn the great business of farming. This requires a teacher on the farm itself, one who is competent to instruct any student how to plant and cultivate all kinds of crops, the management of stock, the use of tools, and to economically manage and improve a farm.

HORTICULTURAL.

We found the plants in the greenhouses in as good condition as we could expect. These houses, or rather the large house, is not so constructed as to be economical in its running expenses. In fact, a house costing one-half as much would accommodate as many plants, could be run at one-half the expense, would grow plants better, could be used to illustrate in the teaching just as well, and we only wonder that Professor Maynard has succeeded so well in growing plants under such difficulties.

In the gardens and pleasure-grounds we found every thing neat, orderly, and in good condition. The nurseries, seedling trees, &c., were promising, all looking well, and showing evidence of good cultivation.

The orchards of apples, pears, and peaches, were in an unsatisfactory condition, some of the trees growing well, while others were stunted and dying. There was only a very small crop of fruit in the vineyard. No method of pruning seems to have been adopted, and here was where we would like to have seen the various methods of pruning grape-vines illustrated: it would involve no particular trouble or expense, and would be practical teaching to the students, and also to the public who visit the College.

CHEMICAL DEPARTMENT.

As usual, the laboratory and every thing connected with this department was in perfect order; the researches of the able gentleman at its head have been of great value to the farming interest of our State as well as to the College itself;

and his methods of imparting knowledge to his classes are said to be admirable.

In all of the recitation-rooms every thing appeared to be going along properly. In the examinations the students displayed a great interest, and appeared well.

The president is enthusiastic, and works hard to make all departments of the institution a success, and, as a teacher of theoretical agriculture, hardly has his equal.

FINANCIAL.

There has been an improvement in the financial exhibit of the College.

For the first time in its existence it has lived within its means, and has a balance in its treasury. The outlay needed for repairs, however, would probably absorb all of this balance.

It is economy for the State to keep the College buildings in good repair, and there is great need of it at the present time. One of the large buildings occupied by the students was apparently finished with unseasoned lumber, and, although nearly new, is almost unfit for use, and will require a large expenditure to put it in a proper condition for the suitable accommodation of the occupants.

We know that the College is in need of more money. One great mistake has been, that the management have endeavored to do more than their means would allow. And, as a rule, we should say,—

1st, That the College should not incur any debts.

2d, That the teaching should be directed to the exact purpose for which the College was founded; viz., to support one college where the leading object shall be to teach such branches of learning as are related to agriculture.

3d, The farm. No more acres should be cultivated than can be done in the very best manner, to the end that such cultivation may illustrate practically, to the students, advanced and progressive agriculture; and also compel the respect and admiration of visitors in the actual working of the farm.

All of which is respectfully submitted.

JOHN B. MOORE.

A. P. SLADE.

M. I. WHEELER.

REPORT OF COMMITTEE.

THE committee appointed by the Board of Agriculture to visit the Agricultural College, and examine the senior class in agriculture, attended to that duty June 23, 1880.

Only one member of the committee reached the College in the morning in season to participate in the public exercises as advertised; and Mr. Benjamin P. Ware of Marblehead, a member of our Board, and W. L. Warner of Sunderland, President of the Hampshire Argicultural Society, very kindly assisted your committee in the examination.

The class was small in numbers; but we hope and trust that this deficiency was more than compensated for in the quality of brain, culture, and acquirements of the young men.

The public examination continued for two hours, embracing a variety of topics: such as soils, their composition, origin, varieties, characteristics, adaptations, the methods and effects of tillage.

Plants, their structure; organs of plants, and their offices; their composition, and the sources from which the materials of their structure are obtained.

Soils and plants, the effect on the soil of natural plant-growth, and the effect of artificial production.

The conditions of an exhausted soil, fertilization of the soil, agents and substances employed for this purpose, how obtained, and their influences on soils and plants.

Farm management, economy, and accounts; selection, division, and cropping of a farm.

Growing grain as a market-product, and its effect on the farm.

The influence of agriculture on national character, wealth, and prosperity; and several other topics.

The young men acquitted themselves very creditably, showing that they had been carefully and thoroughly in-

structed in general principles, answering questions readily and intelligently, expressing their thoughts in good English, clearly, properly, concisely.

Essays were submitted for our examination, written by the class in the presence of President Stockbridge, without the aid of books, upon topics given out by him at the time.

The merits of these papers, together with the oral examination in the morning, was to determine the award of the Grinnell prizes of fifty and thirty dollars.

That of fifty dollars was awarded to Almon H. Stone of Phillipston, and that of thirty dollars to William G. Lee of Amherst.

Your committee were present at the rhetorical exercises of the other classes, and the graduating exercises of the seniors in the presence of his Excellency Gov. Long, the Trustees and Faculty of the College, and the public. We also witnessed the military drills and observed the deportment of the young men in their intercourse with each other, the Faculty, and visitors; and it gives us much pleasure to express our appreciation of their gentlemanly bearing and refined manners, and the respect, good will, and esteem they manifested towards President Stockbridge and the Faculty of instructors.

We fully believe that the institution is doing good faithful work in the line of practical education for the duties of the field and laboratory, and also fitting its young men for military service and the varied duties of citizenship; and we trust the time is not far in the future when a larger share of that public confidence, which is the support and most powerful incentive to high attainment of all institutions of learning recognized and fostered by the parental care of the State, may be more generously extended to this young College; filling its halls with students; securing from its friends and from the State a more ample pecuniary endowment; enabling its board of management and Faculty to provide more perfect courses and appliances of instruction, enter new fields of investigation and experiment, enlarging the boundaries of human knowledge, and devising new and improved methods of employing the vast productive forces of Nature and civilization, and thus elevate the laborer by relieving him of drudgery, giving intelligent direction to his powerful ener-

gies, while securing to him those results and rewards that can only be achieved, in any department of human industry, by the exercise of skill, based on the possession of scientific knowledge.

JAMES P. LYNDE,
For the Committee.

JAN. 10, 1881.

DR. JOHN CUMMINGS, Treasurer, in Account with MASSACHUSETTS AGRICULTURAL COLLEGE.
CR.

1880.	1880.	1880.	1880.	1880.
Jan. 16,	To Balance, Cash on hand	\$575 49	By Expenses, Farm account	\$3,804 01
	Receipts, Farm account	2,395 73	Term-bill account	990 51
	Term-bill account	4,253 53	Grinnell Prize Fund account	80 00
	Grinnell Prize Fund account	80 00	Hills Fund account	565 61
	Hills Fund account	600 00	Salary account	10,101 00
	Massachusetts Society School Fund account	288 00	Farnsworth Prize Fund acc't, Current expense account	65 00
	Mary Robinson School Fund account	70 00	Laboratory account	2,953 92
	Botanical account	2,094 68	Botanical account	712 16
	Botanical account	13,080 21	Extra instruction account	2,579 79
	State Endowment Fund acc't, Farnsworth Prize Fund acc't, Current expense account	100 00	Mass. Scholarship Fund acc't, Mary Robinson Fund acc't	870 76
	Laboratory account	118 04	Interest account	288 00
		678 09	By Balance, Cash	70 00
				15 00
				1,238 01
				\$24,333 77

JOHN CUMMING, Treasurer.

SUNDRIES DR. TO MASS. AGRICULTURAL COLLEGE, JAN. 1, 1881.

Real estate	\$200,000 00
Live stock, appraised.	3,202 00
Implements, vehicles, &c.	1,896 00
Produce on hand	2,023 00
Cash	1,238 01
	————— \$208,359 01

MASS. AGRICULTURAL COLLEGE DR. TO SUNDRIES.

Robinson Prize Fund account	\$35 00
Farnsworth Prize Fund account	74 27
Grinnell Prize Fund account	50 00
Toten Prize Fund account	8 00
Hills Fund account	132 76
Laboratory account	173 54
	————— \$473 57



HOUSE DOCUMENT.

No. 35.

NINETEENTH ANNUAL REPORT
OF THE
MASSACHUSETTS
AGRICULTURAL COLLEGE.

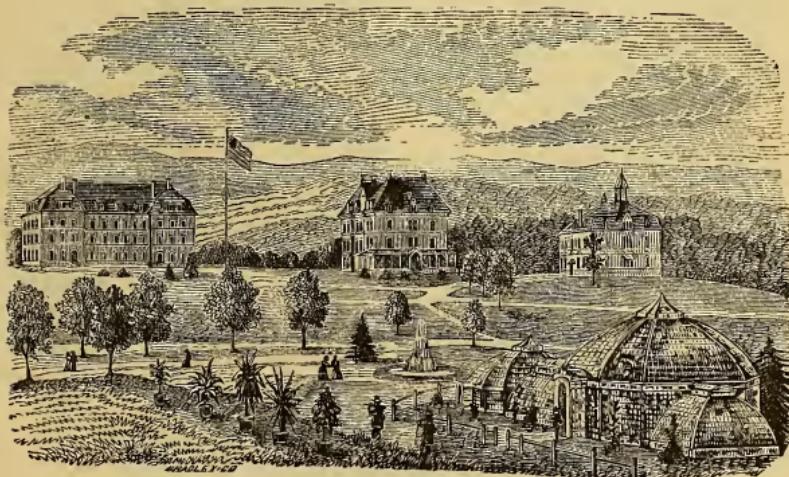
JANUARY, 1882.



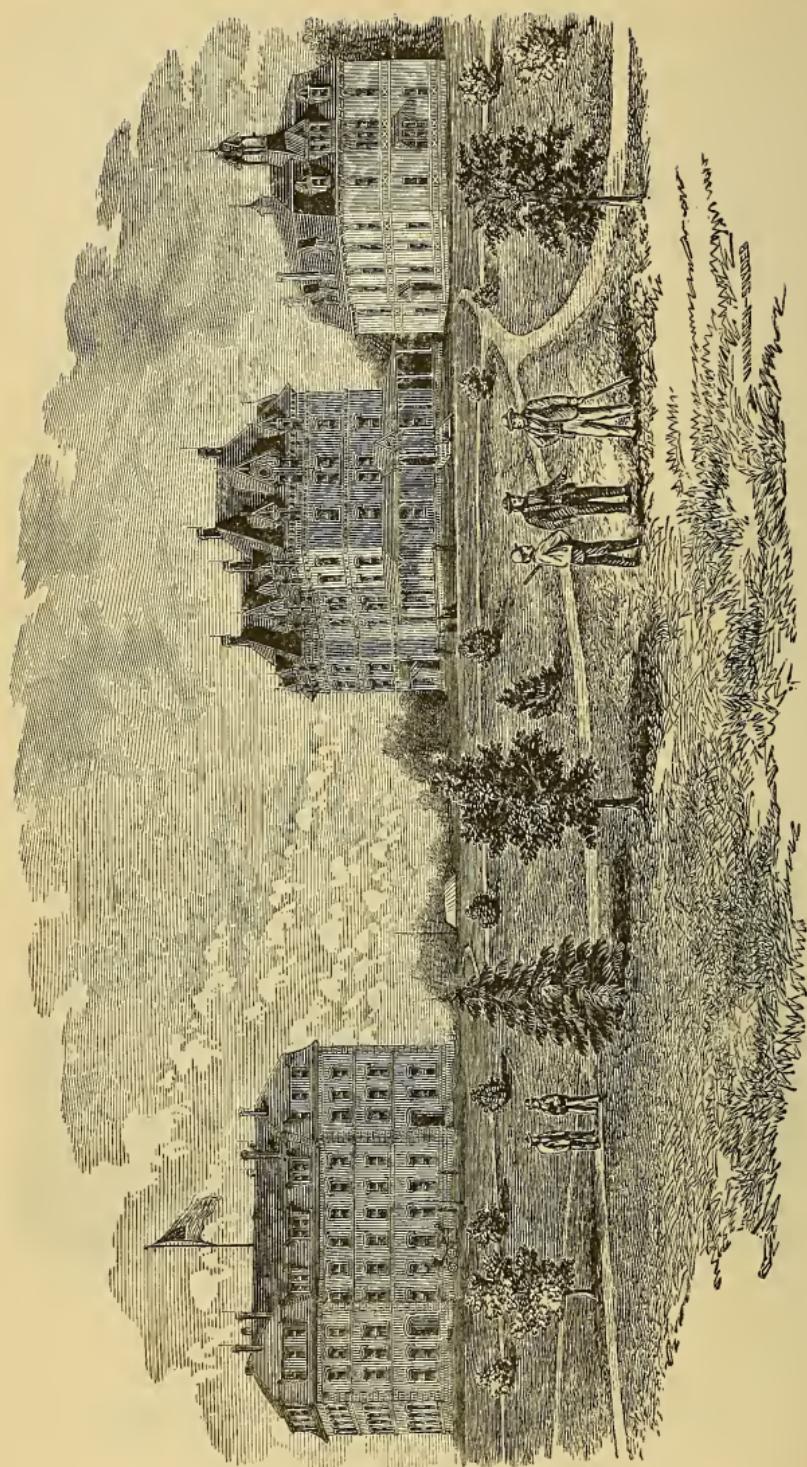
BOSTON:
Rand, Avery, & Co., Printers to the Commonwealth,
117 FRANKLIN STREET.
1882.

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AGRICULTURAL COLLEGE.

JANUARY, 1882.



BOSTON:
Rand, Avery, & Co., Printers to the Commonwealth,
117 FRANKLIN STREET.
1882.



Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT, BOSTON, Jan. 28, 1882.

To the Honorable the House of Representatives.

I HAVE the honor herewith to transmit for the information and use of the General Court the Nineteenth Annual Report of the Trustees of the Massachusetts Agricultural College.

JOHN D. LONG.

Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, MASS., Jan. 27, 1882.

To his Excellency JOHN D. LONG.

DEAR SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Nineteenth Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,

Your obedient servant,

LEVI STOCKBRIDGE, *President.*

INDEX.

	PAGE
Wants of the Institution	14
Chemical Department	22
Report of the Botanic Department	24
Statement of Horticultural Department	27
Department of Physics and Civil Engineering	28
Report on the Military Department	29
Catalogue of Officers, Students, and Graduates	35
Course of Study and Training	50
Calendar for 1882	51
Terms of Admission	51
Expenses	52
Remarks	52
Post-Graduate Course	53
Books, Apparatus, and Specimens in Natural History	54
Prizes	54
Regulations	55
Size of Rooms	56
Scholarships	57
Statement of Cash Receipts and Payments	58

ANNUAL REPORT.

To his Excellency the Governor and the Honorable Council.

THE Trustees of the Massachusetts Agricultural College, in compliance with the provisions of law, herewith present their annual report. During the year, they and their College officers have made the most strenuous efforts to continue and maintain the established system in all departments, and, considering the difficulties of the present situation, with a good degree of success. By assigning extra work to the professors, and keeping their salaries at the lowest point possible without losing their services, by refusing all appropriations for investigations and improvements on the estate, by confining all our operations to those of imperative necessity, and the practice of rigid economy in these, we have succeeded in keeping our expenses within our income, and making sundry needed repairs on the buildings. The work of the farm has been directed to ordinary crop operations, with the exception of ploughing and reseeding some portions of the pasture for the purpose of increasing the quantity and improving the quality of its grasses. The area in tillage was forty-seven acres; viz., Indian corn, twenty acres, yielding eighteen hundred bushels of ears and forty-five tons of fodder; rye, twelve acres, yielding a hundred and eighty bushels of grain and fifteen tons of straw; oats, eight acres, yielding four hundred bushels of grain and fourteen tons of straw; potatoes, four acres, yielding five hundred bushels; turnips, one acre, yielding four hundred bushels; and two acres in cabbage and other garden vegetables. Seventy-five acres were in grass, yielding a hundred and sixty tons of hay. Twelve acres

have been ploughed and sown with winter rye for next year's crop, and forty acres were ploughed in the fall to be cropped next year. The neat stock at the present time is forty-three head, included in which are two pairs of large oxen, being stall fed, and nineteen cows. There are ninety swine of the Berkshire breed. The herd of cattle has nearly doubled since its reduction in 1879, and is in good condition, with many choice animals. It has not been sufficiently large, since the time named, to consume the hay and fodder product of the farm, quite a large part of which has been sold, and a portion of the proceeds expended in purchasing stable manure at the village, or commercial fertilizers. The receipts and expenditures for the farm, including the payment for student-labor, show a small balance in its favor.

Mr. D. H. Tillson as farm-foreman has discharged his difficult and responsible duties with great fidelity, and made unwearied efforts to command success. As usual, the horticultural department has been ably conducted by Professor Maynard. Its business is enlarging and becoming more important every year. The sale of flowers, bedding and potted plants, shrubs, ornamental trees, fruit-trees, and fruits, is quite large, aggregating during the last season about four thousand dollars. What may be called the business of this department is carried on at a profit, and would show a decided balance in its favor; but this balance is more than consumed in the support of the Durfee Plant-House, which is little but a show-house, returning small revenue, though of much interest to the public, and very valuable for study and instruction. For further information of this department, reference is made to the annexed report of Professor Maynard. During the past year there have been the following changes in our corps of instructors: Professor William B. Graves, who for six years occupied the chair of physics and mathematics, and discharged its duties with fidelity and success, resigned his position in August to take a situation at Phillips Academy in Andover; and the place has been temporarily filled by the employment of Professor Charles L. Harrington, whose course here has fully sustained his reputation as a successful and enthusiastic teacher. The detail period of three years of Lieut. Charles Morris, as instructor of military science and tactics, expired the 1st of September;

and he returned to his regiment. The United States Government detailed Lieut. Victor H. Bridgman to the place, and he has entered upon his duties in such a manner as to give bright promise of the greatest efficiency and success. These new men have apparently imbibed to the full of the Agricultural College enterprise, have harmonized perfectly with the previous members of the faculty, giving their sympathy and co-operation in all their trials and successes. Annexed is a report from each on the present condition and wants of their respective departments. The other members — Professors Goodell, Goessmann, and Maynard — have as usual put forth every effort to maintain the efficiency of their departments, the general *morale* of the College, and a high standard as an educational institution. Though the duties of the permanent members have been increased to a dangerous point since 1879, they have found it impossible to give instruction in all the branches required by the curriculum; and it has been necessary to employ specialists to take the courses in geology, zoölogy, and veterinary. There has been no material diminution in the number of students. At the opening of the college year nineteen were received to the freshman class in the regular course, one as a special, and five for the post-graduate course. The students as a whole have availed themselves of their privileges, and performed their required duties with cheerfulness and alacrity, have respected the regulations of the College, been earnest in contributing to maintain its high character, and enthusiastic in supporting its distinctive features. The present winter they have originated and carried into successful operation a course of weekly evening lectures from specialists in the science and practice of agriculture, which the public are invited to attend, and which cannot fail of being highly beneficial. The anniversary exercises were of a superior order. They were attended by his Excellency the Governor and staff, by the members of the Board of Agriculture, the friends of the College and graduates, many of the Alumni, and more generally than usual by the public. It is evident that these exercises are yearly attracting more and more attention, that the circle of their influence is enlarging, and that the agricultural portion of the community are coming to consider the commencement exercises of the College an occasion of great import. The Farnsworth

prizes for excellence in declamation were awarded,—the gold medals to Charles T. Conger of New York, of the sophomore class, and George Cutler, jun., of Amherst, of the freshman class; the silver medals to Homer J. Wheeler of Boston, of the sophomore class, and Elisha A. Jones of Rockville, Mass., of the freshman class. The Grinnell prizes to the graduating class for the best written and oral examinations in agriculture were awarded, the first, of fifty dollars, to Henry W. Wilcox of Nawiliwili, S.I., and the second, of thirty dollars, to Austin Peters of Boston. The graduating class numbered nineteen, who, having completed the required course of study and examinations, received the degree of Bachelor of Science; and seven of the number who were matriculants of the Boston University received the diplomas of that institution. A valuable addition has been recently made to the natural-history cabinet of the College, by a donation from Winfred A. Stearns, a young naturalist of Amherst. It consists of many thousand specimens in the departments of mineralogy, entomology, and conchology, and a large collection of the nests and eggs of the birds of New England. Want of room and cases have seriously interfered with its arrangement in suitable order for exhibition and study, but yet it is a great acquisition to this department. For want of means the improvements of the year on the land or buildings have been few, and those more in the direction of preserving what we have from unavoidable decay and deterioration rather than of changes for permanent improvement. On the farm, work, in gradually developing the arranged system of drainage, and breaking up and subduing the uncultivated land near the western boundary, was discontinued in the fall of 1879, and has not been renewed; but, as already stated, fourteen acres of the pasture, which was becoming infested with small shrubs and coarse grasses, have been ploughed and reseeded; and there has been much grading and reseeding done near the L. D. Cowles homestead. The Durfee Plant-House, which was getting seriously out of repair by the settling of the arches of the roof, and the decay of the sills, the floors, and benches, has been repaired by lifting the arches, and supporting them with iron standards, putting down new floors, benches, and shelves, and painting the entire structure inside and out, the whole cost of which has been more than

six hundred dollars. At an early day it will require further repairs on the foundations, sills, and walls of the propagating pits. By act of the last Legislature, the Massachusetts Central Railroad was granted the right of way to cross the College farm; and the surveys have been made, and the permanent line definitely located. The line runs from the south farm-bound in a north-west direction on a long curve, through the full width of the estate, about thirty rods west of the College buildings and farm-barn, and between the latter and the pastures. The road does not come at grade with the surface to any extent, but consists of cuts and fills, and will be a serious disarrangement of our system of field-plotting, will cause no little inconvenience in the management and care of the farm-stock, and the general operations of carrying on the west half of the farm. The land-damages have not been adjusted, though propositions have been made by both parties. It is believed that a settlement will soon be made, reasonable compensation given, direct and indirect, in money and privileges; but it must result in a lasting injury to the estate.

When the Commonwealth received the endowment-fund of the College from the United States, it was stipulated in the compact that the State should provide all the buildings needed by the institution, and keep them in repair, without using any of the fund, or the income thereof, for that purpose. In 1867 and 1868 funds were provided by the State and the town of Amherst for the erection of such structures as were deemed necessary. Some of them were built rapidly, to meet existing emergencies; and thirteen years' use, and perhaps, in some cases, the original employment of improper material and poor workmanship, has caused much deterioration and need of repair. The State having made no provision for such necessities, the Trustees, to prevent serious losses, have deemed it their duty, during the last two years, to expend sixteen hundred dollars for this purpose from their general income. The money thus expended was greatly needed by the different educational departments, and nothing but the imperative necessities of the case could justify its employment in this manner. Similar work is still needed; and we respectfully suggest to the consideration of the Legislature whether the spirit or letter of the compact with the General Government can be complied with, only by the State assuming this obliga-

tion, and employing the income exclusively for educational purposes.

WANTS OF THE INSTITUTION.

As the law required military tactics and drill to be taught in the College, it was deemed best, that, so far as possible, this instruction should be given in the winter months, when the students could not have full employment on the farm; and, as winter drill in the field was impracticable, a drill-hall was provided in the third or attic story of the laboratory building. But the marching and evolutions of the battalion, continued for ten years, have so strained and weakened the structure, as to create serious apprehension of its complete ruin: therefore, for three years, its use for this purpose has been discontinued; and the winter drill, so important in the general system, has been practically abandoned. Estimates were made by a practical builder of the cost of such repairs and supports as were considered necessary to make the structure secure and safe to the battalion; but it has been beyond our power to make the necessary repairs and improvements. The agricultural department has always suffered for want of proper accommodations and appliances, and for apparatus and objects for lecture instruction. To make it thoroughly effective and useful, the professor should have an ample lecture-room, with cabinet-rooms adjoining, where specimen crops, tools, implements, and farm machines and appliances in all its departments could be collected and arranged for use before his classes, and for private study. Such a cabinet would cost no money, but would be of incalculable advantage to the students, and a place of resort and instruction to the farmers of the State. A suitable building could be erected for fifteen thousand dollars; and on the earth in its basement a military drill-room could be provided, for winter and stormy weather, which would be convenient, and beyond the possibility of injury by the marching and evolutions of the cadets. By this method the expense of repairs on the present hall would be avoided; and it could be used for other college purposes, and the suffering want of the agricultural department supplied. Repairs and refitting are needed at the boarding-house; and the kitchen and dining-room furniture, which has been in constant use fourteen years, should be replaced by

new. The library is far from being what is needed, either in the number of its volumes or its departments ; and it is thus, not because the Trustees do not appreciate the great value of books to both instructors and students, but because of their inability to replenish it from year to year with new and standard works for culture, reference, and instruction. When the College was opened, the trustees of Amherst College kindly offered the use of their extensive and valuable library to our students and Faculty on the same conditions as to their own. This generous offer has been availed of quite freely, and its advantages highly prized ; but there is an extensive line of works specially needed, and adapted to the wants of the students of the Agricultural College, which are not found there : and its distance is such as to make its use a great inconvenience. Some means should be provided for making regular additions to the College library, and a suitable room for its keeping ; and the College will be far from having its necessary equipment until this is done. We thus express our views of the wants of the institution committed to our care, with the feeling that it is doubtful if the general public, or even the Legislature, fully appreciate the magnitude of the enterprise, or the skill, intelligence, and means necessary to carry it forward successfully, or in a manner creditable to the State. As was intended by its founders, the College is an educational institution, with its distinct departments, apparatus, cabinets, and instructors like other New England colleges, but with the addition of technical courses relating to the theory and practice of agriculture, and other industrial arts, to make which efficient and useful, requires of its Trustees the same executive care and oversight in all details, the same financial provisions, and the same responsibilities in kind and extent as are required of the trustees of other colleges. The farm is a very large one, with its buildings, stock, tools, teams, crops, and business operations of all kinds, like other large farms, and, owing to the peculiar circumstances of its connections and objects, requires more than ordinary care, foresight, and responsibility. The horticultural department, with its conservatories, nurseries, fruiteries, and landscape gardening areas, is a business operation of no small magnitude. Each of these divisions of the enterprise is indispensable as a part of the general system of the institution ;

and each, from a business stand-point, is of sufficient size and importance to monopolize the time and thought of an able board of direction, the skill and energy of the best executive talent; and the whole and each is enlarged and complicated by the necessity of making each contribute to the technical education of the students. In addition to this, there is a somewhat pronounced public opinion that constant effort should be made, and expenses incurred, for the benefit of the general agriculture of the State, by carrying forward investigations to demonstrate and establish principles of practical importance. If the entire institution consisted of the College proper, with the indispensable professorships supplied with the necessary appliances and apparatus to make the instruction what it should be, the present income of the College would be inadequate to its proper support; and, as the farm and horticultural departments must be used to a greater or less extent to give technical education to students, they cannot be relied upon to contribute to this purpose. Our efforts the last two years to bring the College to the highest efficiency having convinced us of its impossibility with only its present income, it was thought desirable to institute measures to increase the endowment-fund to such an amount as is required to yield an ample and reliable revenue. Therefore a joint convention to consider the subject, consisting of his Excellency the Governor and Executive Council, the Board of Trustees, and the Board of Agriculture, was held at the College on the 22d of last June.

Gov. Long acted as president of the convention, and called upon Hon. Daniel Needham of the Board of Trustees to make statements showing the condition and wants of the College, and the reasons for calling the convention. In response Col. Needham passed in rapid review the history of the agricultural colleges of Europe, and the great benefit resulting therefrom; the early efforts to establish them in this country, alluding in particular to the commission given by the State of Massachusetts in 1851 to Dr. Hitchcock, to examine the agricultural schools of England, France, and Germany, and his report thereon to the Legislature. He traced, with some detail, the subsequent efforts to establish agricultural schools in several of the States, and the gradual and decided change in public opinion in their favor until about 1860, when the—

" Hon. Justin S. Morrill of Vermont, then a member of the House of Representatives, brought the matter again before Congress. It was discussed from time to time,—now prostrated by defeat, and again bidding fair promise of success, until 1862, when the Act upon which the present Agricultural College is based was passed by both Houses of Congress, received the signature of the President, and became a law.

" As is well known, the law provided grants of lands proportioned to the population in the several States, as a fund for the support of agricultural colleges. Among the provisions of the Act, was one that military tactics should be taught in the College. I think this has been one of the most difficult obstacles we have had to overcome. The people have found it difficult to see the connection between agriculture and military tactics. Many a severe jest has been made, based upon the provisions of this requirement. But the provision is in the law, and we cannot go back of it. It is no fault of the State that it is there; it is no fault of the trustees that it is there: and perhaps, as we are a nation of citizen soldiers, keeping no standing army, and forever dependent upon the citizens, in case of rebellion or invasion from a foreign foe, it is well that the requirement is made; for, without a soldier's education, the American citizen cannot perform the full duties of citizenship.

" In 1863 the Massachusetts Legislature considered the Act providing for the establishment of colleges in the several States. It was discussed in committee, and reported favorably; it was discussed in the House and Senate,—discussed carefully in detail; every objection was considered and weighed and overcome; and the bill making provision for the Massachusetts Agricultural College was passed by both Houses of the Legislature, received the signature of the Governor, and became the law of the State. The bill fully, unequivocally, and unreservedly accepted the national bounty and the terms of the congressional Act. The State accepted the contract. If it was a mistake, it is now too late to rectify it. The Legislature and the executive head of the State entered into a solemn and deliberate contract with the nation. That responsibility once accepted was accepted for all time. Massachusetts will not go back of her contracts,—she is no repudiator. She cannot shift this College off to other shoulders. She cannot make it a part of another institution. It is an independent organization,—chartered and created for independent work; and the time to regret it has long since passed.

" In the bill accepting the grant, a Board of Trustees was elected by both branches of the Legislature. The gentlemen elected were carefully selected, and were elected without their request or solicitation. They accepted the responsibility,—it was a great one, for an Agricultural College was a new thing, an experiment in Massachusetts: it had older and richer institutions to compete with, it had prejudice from the people to combat, it had a plan to make and shape for which it had no precedent. The agricultural colleges established by despotic governments were no model for the College in the republic of America. So they felt their way—slowly—little by little—in great doubt, uncertainty, and darkness—seldom with great confidence except in the fact

that the principle was sound, the object good, and that in the end the College would justify the act of its founders.

"The town of Amherst, in its recognition of the value of the institution, invited the Trustees to locate it within its borders, and, as an inducement, offered seventy-five thousand dollars. After great deliberation the offer was accepted. In this liberal offer the people of Amherst had the right to expect that the College would be well maintained, and that both State and Trustees would see that no stone would be left unturned to secure success.

"The College was not richly endowed, and the number of students was not large. For this reason poverty met the Trustees at every turn,—in the compensation of professors, in the management of the farm, in the erection of houses for the Faculty; but this poverty was no fault of the Trustees,—they had not agreed, neither could it be expected, that they would furnish money from their own pockets to make good deficits that might occur. So from time to time appeals were made to the Legislature to which every year a full report of the management and condition was made by the Trustees.

"By and by legislators grew weary of these annual or bi-annual calls. The press took up the complaint. Denunciations of the College were in every-day editorials, and at times the public press seemed to be striving to see which could get the lead in its abusive attempts to set forth the uselessness of the State Agricultural College.

"In 1870 or thereabout, the Legislature made a change in the election of the members of the Board of Trustees. Theretofore elected by the Legislature, it was now provided that the Board should be self-perpetuating, and in this way brought into harmony with all educational boards that had been chartered by the State. It was thought, too, that this change would relieve the State of the burden of the College, and that the new Act would shift responsibility.

"The Trustees made no interference with the new action of the Legislature. They had not asked it; they did not oppose it: but, knowing the history of the College, they knew that State responsibility could not be thrown off. Acts might be passed, the statute-book might be covered with resolutions, but this great fact would remain the same. It was too late—too late. By solemn obligation and deliberation the responsibility had been assumed, the lands granted by the government had been sold, the gift of the town of Amherst had been accepted, and there was nothing to be done except for the State to fulfil its part of the contract.

"The Trustees under the new Act of legislation continued to struggle on. The press was against them, and many of the leading farmers of the State preferred to make them and the College the basis of a joke rather than give a word of encouragement.

"At last, determining to test the popular will, free scholarships were offered. That was three years since, and to their delight the College for the first time was filled. Then it was discovered that the people were beginning to appreciate the College, and that prejudice was giving way. But in another year it was found that the finances of the College would

not justify free scholarships, and with deep regret the Trustees were obliged to renew the former policy. The College classes relapsed into their former small numbers, and the taunt of a want of appreciation or absolute uselessness was revived by the press.

“ But was it the fault of the Trustees that the College was poor? Had it been for once only that they would be called upon to bridge over a deficit, or even twice, and then they could have assurance that the College would move on with ease and certainty, they would have gladly put their hands in their pockets, and made good the needed funds. But if free scholarships were to be given the public, there would be no end to this demand; and therefore necessity compelled the change which was most reluctantly made.

“ But one thing is now established, and established beyond question. The farming public have yielded their prejudices, and the Agricultural College is recognized as one of the great means demanded by our advancing civilization. The only impediment now is our poverty. With means we can again offer free scholarships, and with free scholarships our College will be filled.

“ As a means, then, for meeting our great want, and removing the only remaining obstacle in the pathway of the State Agricultural College, I present the following resolution:—

“ *Whereas*, The opportunity afforded for free tuition three years since fully demonstrated that the Agricultural College was appreciated by a large proportion of our farming population, by the increased numbers who sought and secured membership; and

“ *Whereas*, The increasing necessities of our civilization demand free scholarships of all our young men who are ambitious to secure practical education, and whose circumstances do not favor the expenses of tuition; and

“ *Whereas*, The only remaining obstacle in the development and prosperity of the Agricultural College is found in the small means at its disposal, thereby preventing the Trustees from continuing the liberal policy of free scholarships so successfully inaugurated three years since; therefore,

“ *Resolved*, That a committee be appointed to consider the perfect means for the establishment of a large permanent fund for the College, in addition to its present endowment, that its usefulness shall be made commensurate with the designs of its originators, and its scholarships brought within the reach of all the youth of the Commonwealth.”

The resolutions were unanimously adopted after full and free discussion. The following gentlemen were appointed as a committee to consider the entire subject, and to submit a plan at a subsequent meeting of the College Trustees: Hon. Daniel Needham of Groton, Hon. William Knowlton of Upton, Hon. George Taylor of Chicopee, Lieut.-Gov. Weston of Dalton, and Hon. C. L. Flint of Boston. By the sug-

gestion of Gov. Long, the following resolution was passed, and the convention adjourned :—

Resolved, “ That the State Board of Agriculture be requested to require all agricultural societies in this State receiving bounties to support at an expense not less than \$75 one student residing within its limits at the Massachusetts Agricultural College, and that, in case no student is so supported, such amount shall be withheld in the payment of the agricultural bounty to said society, and applied to the general uses of the College.”

The committee attended to their assigned duties ; and at the annual meeting, by their chairman, Hon. Daniel Needham, reported the following plan :—

“ That a fund of one hundred thousand dollars be raised by subscriptions of one thousand dollars each, payable in ten instalments of one hundred dollars a year, with interest at four per centum on all unpaid balances, until the entire sum is paid; and that, whenever said one hundred thousand dollars shall be paid, it shall be handed over by the committee to the treasurer of the College as a permanent fund, the income of which shall be used under the direction of the Board of Trustees.

“ That the conditions upon which this fund shall be bound, shall be as follows: 1st, The present system of electing trustees for filling vacancies shall not be changed. 2d, That the committee shall be perpetuated by the filling of vacancies by the Board of Trustees during the period of ten years during the time which the subscription shall be open.”

The report was accepted, and laid on the table ; and it was voted that the plan should be considered in detail, and measures perfected at an adjourned meeting for its execution.

The Trustees of the College, though a legal “body corporate,” are simply the agents of the State, with duties and powers clearly defined by law. In the statute of Congress the great aims and purposes for which the College endowment was provided, and the obligations assumed by the State in accepting it, are fully set forth; and in the statute of the State the details of administration by which it is proposed to realize those aims are defined, even to the course of study to be pursued, and the proportion of time to be given to each. The responsibility of the Trustees is confined to an economical expenditure of the funds committed to them for purposes expressly defined, and a faithful adherence to the established system. If this is incapable of producing the

designed result, or if the income from funds is inadequate to sustain and develop the system, the responsibility must belong to the State. The experience of fourteen years has demonstrated that the plan of organization is no more extensive, its grade is no higher, than was contemplated by the donors of the endowment, or than is essential to the attainment of the ends sought. Therefore as it exists, in all these respects, it should be supported and maintained.

Respectfully submitted by order of the Trustees.

LEVI STOCKBRIDGE, *President.*

AGRICULTURAL COLLEGE, AMHERST,
Jan. 27, 1882.

CHEMICAL DEPARTMENT.

REPORT BY PROFESSOR CHARLES A. GOESSMANN.

THE instructions in theoretical and practical chemistry have been given during the past year in conformity with the prescribed general course of studies. The freshman class has attended lectures with recitations on elementary chemistry, the junior class on analytical and organic chemistry, and the senior class on industrial and agricultural chemistry. The senior and the junior classes have also devoted the usual time assigned for practical chemical analysis. The substances tested by the students in the laboratory were selected with reference to their interest in every-day life as well as to their special relation to various branches of chemical agricultural industry, and to practical agriculture in particular. Both classes have manifested during the entire year a gratifying interest in these exercises. Five graduates have returned to continue their studies in practical chemistry for a more or less extended period. The number of students attending the exercises in the laboratory during the main part of the year amounted to from forty to forty-five. Aside from the regular class instruction, the usual amount of analytical work has been carried out in the interest of the farming community, which will be reported in the official report of the inspector of commercial fertilizers to the State Board of Agriculture. The investigations regarding the special action of particular articles of plant-food on the character of the plant and on the composition of the fruits has been continued, and some of the results will soon be ready for publication.

The finances of the chemical department are, in consequence of a rigid economy and a large attendance of the practical exercises in the laboratory, in a very satisfactory condition, as may be noticed from the detailed statement of the financial agent of the College, which accompanies this report. The sum credited to the department on the 1st of January, 1882, after deducting all expenses previously

incurred, amounts to eight hundred and twelve dollars. The interest of the College, as well as of the chemical department, render it desirable that permission should be granted to devote at least two-thirds of the above-stated surplus, as soon as convenient, to the increase of collections, and of apparatus for the illustration of lectures in chemistry, and of the practical instruction in the chemical laboratory.

REPORT OF THE BOTANIC DEPARTMENT.

BY PROFESSOR SAMUEL T. MAYNARD.

DURING the past season the "Durfee Plant-House" has been thoroughly repaired and painted. This work required the expenditure of the entire appropriation; besides, a large amount of work has been done by students, and others in our regular employ.

The plants in these houses, although somewhat injured in the process of repairs, are again presenting a fair condition.

The orchards are in better condition than ever before, having received better cultivation than in any previous year. The peach-trees have again yielded a moderate crop of fruit, which, owing to the cool summer, was of rather poor quality. Some of these trees, from ten to fourteen years old, and which have, apparently, passed through all the stages of the disease known as the "yellows," are now in perfect health, and bore some fine fruit the past season.

The vineyard has done remarkably well the past season, considering the care it has received. The income from the sales of fruit amounted to \$259.69, although nearly one ton of unripe fruit was destroyed by the frosts. The vines are all trained in a natural fan system, as requiring the least care. The vines planted in the experimental plots, it is designed to train according to four or five of the leading systems, for illustration.

The small fruits, aside from the grapes, consist of about two acres of strawberries, which are in fine condition; the raspberries and blackberries planted in and around the orchards, and one and one-half acres of the same planted this fall, with the more lately introduced and promising varieties. The varieties of strawberries grown are, for the main crop, Charles Downing, Crescent Seedling, Wilson's Albany, Sharpless, Glendale, Forest Rose, with smaller lots of these new and promising kinds; viz., Bidwell, Crystal City, Triple Crown, Oliver Goldsmith, Duchesse, Miner's Prolific, Hervey

Davis, Pioneer, Champion, Golden Defiance, and Manchester. The latter varieties have been planted in widely varying soil and with several kinds of fertilizers, to enable us to test their real merits for general cultivation.

The varieties of raspberries grown are the Turner, Cuthbert, Caroline, Henrietta, Herstine, and Highland Hardy ; with the two most common black-caps, Doolittle and Mammoth Cluster. Of the blackberries we have the Kittatinny, Wilson's Early, Dorchester, Wachusett, Snyder, Taylor's Prolific, and Sable Queen.

IMPROVEMENTS.

The two unsightly gravel-pits on the land, under the direction of this department, have been graded off, compost carted on, and seeded to grass.

Upon the hillside, near the reservoir, about six hundred feet of tile have been laid, to take away the water from several surface springs, the underbrush and a few of the useless trees removed, and the whole thoroughly ploughed.

A walk has been constructed from the plant-house door to the south boundary of the farm along the side of the road. In its construction about seventy-five loads of stone, taken from the land in the orchard, were used to fill in along the roadside opposite the house occupied by President Stockbridge.

The land to be planted next spring has all been ploughed, and much done to help along the work in the spring. Manure has been carted around the fruit-trees, grape-vines, raspberries, blackberries, and the ornamental trees and shrubs, more liberally than ever before.

EXPERIMENTS.

Besides the experimental plots of fruit under the direction of Dr. Goessmann, which have been cared for, several experiments have been carried on ; but limited space will permit of the mention of only one. In July twelve rows of grape-vines were selected ; and all surplus canes, i.e., those not needed for the formation of the next season's fruit-spurs, having good bunches of fruit upon them, were girdled by taking out a ring of bark one-fourth of an inch wide just below the fruit. Account of the cost of this labor, which extended

from July 10 to Aug. 1, was kept, and the sales of fruit from the girdled branches, before the main crop ripened. The cost of labor was \$18.75 (about one-half more than it ought to have been), and the fruit sold for \$36.18 above the price for the same amount of fruit from the main crop. No injury to the vine has ever been noticed from this practice.

INSTRUCTION.

Aside from the duties directly connected with the Botanic Department,—i.e., the teaching of Botany and Horticulture, the direction of the business and care of the grounds,—extra work has been done in teaching Microscopy, Freehand Drawing, and Landscape Gardening.

SUGGESTIONS.

I would again urge that the course of study be so changed that botany be taught during the summer and fall terms, and not, as is now done, during the winter term, when very few illustrations can be had. I would also ask that more time be allowed me for the instruction of botany and horticulture, and that it be more evenly distributed through the four years' course of study.

To this I have appended a detailed statement of the accounts of the department, as far as my books can show, together with a statement of the amounts received from the sale of each crop.

To this might be added the crop of hay, oats, and corn, which is sufficient for the keeping of two horses, besides exchanging several tons of hay for stable manure.

STATEMENT OF HORTICULTURAL DEPARTMENT.

Cash on hand Jan. 1, 1881	\$2 59
Total cash paid Treasurer from —	
sales of plants, fruits, etc.	1,566 26
from sales of nursery	875 82
paid for labor, materials, and sundries	792 56
on hand Jan. 1, 1882	100 56
 Total Cash sales of the Botanic Department	 \$3,337 79
 Plants turned to balance bills —	
for labor, materials, etc.	\$125 25
trees, etc., for College grounds and farm	103 45
Outstanding bills due	209 84
Trees exchanged for nursery stock	47 60
Bills of College paid by fruit	21 71
 Total sales of Botanic Department	 \$3,845 64
SALES IN DETAIL.	
Plants	\$825 46
Flowers	421 10
Apples	16 61
Pears	41 40
Peaches	117 42
Grapes	259 69
Strawberries	265 53
Blackberries	13 75
Raspberries	25 54
Cabbages	100 91
Cabbage-plants	210 40
Strawberry-plants	28 10
Pease	55 09
Squashes	45 00
Beans (green),	20 34
Sweet corn	31 21
Potatoes	30 72
Celery	15 00
Beets	16 05
Turnips	5 95
Cucumbers	5 42
Tomatoes	6 09
Sundries	37 64
Total sales of nursery	1,251 22
 Total sales of Botanic Department	 \$3,845 64

DEPARTMENT OF PHYSICS AND CIVIL ENGINEERING.

REPORT BY PROFESSOR CHARLES L. HARRINGTON.

THE work in this department is progressing favorably. The science of physics is growing of more importance, as new discoveries are made in electricity and chemistry; and, while it is not advisable to make this branch of study as prominent as some others, it is advisable to make it correspond to the needs of the College. To this end I have, so far as practicable, introduced the lecture method of giving instruction; and I find that the students have a better understanding of the matter under discussion, take more interest in their work, and accomplish double the work in the same time as under the method formerly in vogue. To fully carry out my plan, the apparatus should be repaired and increased. Mechanics and electricity are well provided for; but sound, heat, and light are wholly deficient. Four thousand dollars is the amount required to place the physical cabinet in even respectable condition for a college in the position of our Agricultural College. As soon as your Board are in a condition to make the additions and changes you so much desire, this matter should be thoroughly examined and acted upon. The cabinet in its present position is unsafe; and, whenever a new building is erected, I would recommend that a change be made to a more safe position. If these suggestions result according to my desire, I cannot but believe that you will be fully repaid by the increased interest of the students in their study.

The time allotted for mathematics is used to the best advantage. I would like your Board to consider whether it would not be advisable to raise the standard of admission so as to include one or perhaps two books of geometry. The change would enable us to accomplish that for which now we have no time, and which is necessary to a full understanding of some other branches of study.

Your Board have reason to be congratulated on the present condition of the department, and any change for the better will be heartily welcomed by those most interested in the success of the College.

REPORT ON THE MILITARY DEPARTMENT.

BY PROFESSOR VICTOR H. BRIDGMAN, LIEUTENANT SECOND
UNITED STATES ARTILLERY.

I HAVE the honor to submit the following as a brief report of the military department, and my observations and suggestions concerning same. It has been under my charge during the past four months.

On Aug. 27, 1881, I received orders from the War Department, Washington, to report to you, relieving Lieut. Charles Morris, Fifth Artillery, as professor of military science and tactics at this institution. Before my arrival he had been necessarily called away; so that, unacquainted with the requirements of the position, and with no defined order of instruction to be followed, I found some temporary embarrassment in the satisfactory execution of my office. This was greatly diminished by the kindness of Lieut. Morris, who had left some general instructions for my guidance. The necessity of a carefully defined course of instruction being thus presented, it has met my early attention; and the request that each class, commencing as freshmen, should be called to the section-room, has resulted therefrom.

Previously seniors alone have had theoretical instruction, and with these results: The studies which naturally first engage their attention are tactical. Satisfactorily pursued with the time allotted,—two hours each week,—they must engage their attention one-half of their senior year, leaving too little time for military science. Upon entering their final year, it has become the recognized plan of the department to place all seniors by detail in active charge of practical work on the drill-ground, both to familiarize them in the actual requirements of such duties, teaching them to command, and as a necessary aid to the military professor, who can only take a supervisory charge when, as is ordinarily the case, two or three distinct drills are being carried on at the same time in different parts of the drill-ground by different

classes. It is obvious that a system which perfected instructors only after half of the time in which they were to instruct had elapsed is faulty. Tactical accuracy is especially necessary, and *any* imperfect instruction creates faults hard to eradicate. Again, junior classes, as they advance in successive years, will take a more decided interest in drills while acquiring them for the first time than months after, when exercised therein more to keep them up to a proper standard than to acquire what, at least, is generally known. Each class in the section-room for from six to eight weeks, two hours each week, the latter half of their first term of successive school years, called upon to explain theoretically what they are there learning practically for the first time, will be *accurately* taught; and, the time being brief, the lessons do not become a burden. In this way seniors will take their places well prepared to perform such duties as devolve upon them, and their entire year can be devoted to scientific and other profitable study. Hereto appended is the modified course of theoretical and practical instruction of this department; and I earnestly recommend that it may be incorporated into the curriculum of the institution entire, thereby introducing the desired changes. The time asked for each junior class does not exceed sixteen hours in the section-room for an entire year; and, from the experience I am now having, the advantage of this course will be invaluable. Much detriment to the proper continuance of practical instruction during the winter months and in inclement weather is caused by the insecurity of the drill-hall. Its location in the upper story of a not over-strong building is unfortunate. At present the hall can with safety be used but little for the purposes designed. The winter months are particularly useful for such preliminary drills as lay the basis to extended exercises; and, as these are thus greatly restricted, the effect is to partially defeat the purposes of this instruction. I recommend that immediate steps be taken to repair this hall, and would suggest that the most expedient method would be the erection of a new building, the lower story to be used for military purposes. The present uniform, while neat and military in appearance, does not fulfil the requirements of all the drills. A jacket allowing more freedom for the upper portion of the body at mortar and artillery drills is desirable. This can be

introduced, still keeping within the prescribed cost of the military outfit; and it would be generally worn at all times. A suitable military cabinet would be of material aid in the section-room, and could be obtained from the State without much expense. The department is in serious need of a small permanent fund to be used for the gradual formation of a military library. The necessity for this is self-evident, and its lack is especially felt in the more advanced studies.

It seems proper to call the attention of the honorable Board of Trustees to the excellent military condition of the school. The time devoted to all drills does not exceed four hours per week, scarcely more than students at other colleges, for healthful purposes, devote to prescribed physical exercises. To-day it may safely be asserted, that, on short notice, the corps could creditably appear on company, skirmish, battalion, mortar, and artillery drills; and that the majority of the present senior class will graduate, prepared, if an emergency should require it, to immediately perform efficient service, at least, as company officers. The purposes of the endowment of 1862 on the part of the General Government — the quasi-military education of the students, that they shall be enabled to impart that instruction, and, when needed, be capable of exercising subordinate military offices — seems to be successfully carried out at this institution. This is largely due to the interest manifested by the students, who, as a class, respond cheerfully to the performance of all duties. Additional means should be taken to encourage them to more zealous efforts. The inducement held out by the State or General Government to some official position for excellence seems the most natural means of effecting this. This department is at all times prepared to practically explain its utility to visitors; and more frequent visits from the honorable Board of Trustees, collectively or individually, as well as from others, would induce additional exertion. I am convinced that a more general knowledge of the interior workings of the department would result markedly to its advantage.

Promptness of conception and execution must follow the proper execution of the drills. Self-command and self-discipline must obtain to the individual who efficiently commands the same; all of which, in their natural order, falls to the lot

of the student at this College. While the avowed purpose of the United States, in endowing this and similar institutions, was to diffuse a limited military instruction, the result is directly beneficial to the individual student in any life-avocation he may select. To this may be added the advanced course which is given to seniors, embracing, as it always will, a variety of useful and interesting subjects.

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

All students, unless disqualified physically, are required to attend prescribed military exercises, those who pursue special or partial courses at the College not being exempt so long as they remain at the institution. By the commencement of their second term, students are required to provide themselves with a full uniform, the cost of which is less than thirty dollars.

Correctness of deportment and discipline is required of all, the routine of the West Point Academy being followed as closely as circumstances will permit. To insure a proper sanitary condition of the College, the commandant makes careful inspections of all rooms and College buildings each Saturday morning, during which all students in uniform are required to be in their rooms, for the proper police of which they are held to a strict accountability.

At the beginning of each term, issues of such equipments as they will require are made to all students. They will be charged for all injury, loss, and for any neglect in the care of the same.

For practical instruction the following public property is in the hands of the College authorities:—

One platoon of light Napoleons (dismounted).

One six-pounder with limber and equipments.

Seventy-five sabres and belts.

One hundred and fifty breech-loading rifles (Cadet model).

Several accurate target rifles.

Two 8-inch siege mortars with complete equipments.

For practice firing, the United States furnishes blank cartridges for all guns, and ball cartridges for rifle target practice, which is encouraged by the department.

Fall term, freshman year.

Recitations in infantry tactics (Upton's). School of the

soldier. School of the company. Skirmish drill. Two hours per week for eight weeks.

Fall term, sophomore year.

Recitations in United States artillery tactics.

School of the soldier (dismounted), sabre exercise, manual of the piece and mechanical manœuvres, bayonet exercise (infantry tactics). Ammunition, equipment of carriages. Modified service of 8-inch mortars. Two hours per week for six weeks.

Fall term, junior year.

Recitations in infantry tactics (Upton's).

School of the battalion. Ceremonies. Camping and field service. Two hours per week for eight weeks.

Spring term, junior year.

A general review of all tactical studies two hours per week for six weeks.

Drills amounting to about four hours per week as follows: —

Infantry tactics; the schools of the soldier, company, and battalion; manual of arms and sword; bayonet exercise, skirmish drill, target practice; ceremonies, marches, and field service.

Artillery tactics: the schools of the soldier, detachment, and battery (dismounted). Mortar drill, sabre exercise, pointing, and field service.

MILITARY SCIENCE.

This instruction is given to seniors, extending through the entire college year, two hours per week.

It will include, in the form of lectures and recitations from selected text-books, the following subjects: —

Ordnance and gunnery; constitutional and military law and history; campaigns and battles; systems of warfare, present and past; an elementary course in strategy and engineering. It will be modified by such additions and changes as shall seem desirable.

Two essays are required from each senior on military subjects during the course. Those of the first set are read before the entire college during the winter term. The second set, all upon the same subject, are written for prizes. The award of same is left to a board of army officers, and the

successful competitors read their productions at the graduating exercises.

Subject for class of 1882, "The Military Problem of the United States."

BATTALION ORGANIZATION.

For instruction in infantry tactics and discipline, the cadets are organized into a battalion of two or more companies under the commandant. The officers, commissioned and non-commissioned, are selected from those cadets who are best instructed and most soldier-like in the discharge of their duties. As a rule, the commissioned officers are taken from the seniors, the sergeants from the juniors, and the corporals from the sophomores. All seniors are detailed to act as commissioned officers.

Commissioned Staff.

J. E. WILDER, *Capt. and Adjutant.* S. C. DAMON, *Lieut. and Quarter-master.*

Captains.

B. A. KINNEY.

A. H. TAYLOR.

Lieutenants.

F. S. MAY.	W. H. BISHOP.	D. GOODALE.
A. F. SHIVERICK.	C. D. HILLMAN.	J. S. WILLIAMS.
W. H. THURSTON.		

Non-commissioned Staff.

A. A. HEVIA, *Sergeant-Major.* D. O. NOURSE, *Q. M. Sergeant.*

Sergeants.

H. J. WHEELER.	C. W. MINOTT.
F. H. FLETCHER.	S. C. BAGLEY.

Corporals.

G. CUTLER.	H. E. V. GOESSMANN.	C. HERMES.
E. A. JONES.	W. A. MAYO.	

CATALOGUE
OF
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1881.

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

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Lecturer on Geology.

JOHN M. TYLER, M.A.,

Lecturer on Zoölogy and Entomology.

JOHN W. CLARK, B.S.,

Superintendent of Nurseries.

Graduates of 1881.*

Bowman, Charles Abel (Boston Univ.)	Billerica.
Boynton, Charles Enoch	Groveland.
Carr, Walter Frank	Clinton.
Chapin, Henry Edgerton	Springfield.
Fairfield, Frank Hamilton (Boston Univ.),	Waltham.
Flint, Charles Louis, jun. (Boston Univ.),	Boston.
Hashiguchi, Boonzo (Boston Univ.)	Tokio, Japan.
Hills, Joseph Lawrence (Boston Univ.)	Boston.
Howe, Elmer Dwight	Marlborough.
Peters, Austin (Boston Univ.)	Boston.
Rawson, Edward Briggs	Brooklyn, N.Y.
Smith, Hiram Fred Markley	North Hadley.
Spalding, Abel Walter (Boston Univ.)	Billerica.
Taylor, Frederic Patterson (Bost. Univ.),	Boston.
Warner, Clarence Duane	Granby.
Whittaker, Arthur	Needham.
Wilcox, Henry Harrison	Nawiliwili, S.I.
Total	17

Senior Class.

Allen, Francis Sherwin	Medfield.
Aplin, George Thomas	East Putney, Vt.
Beach, Charles Edward	Hartford, Conn.
Bingham, Eugene Percival	Fitchburg.
Bishop, William Herbert	Diamond Hill, R.I.
Brodt, Harry Snowden	Dansville, N.Y.
Chandler, Everett Sawyer	Coldwater, Mich.
Cooper, James Willard	East Bridgewater.
Cutter, John Ashburton	New York City.
Damon, Samuel Chester	Lancaster.
Floyd, Charles Walter	Boston.
Goodale, David	Marlborough.
Hillman, Charles Dexter	Hardwick.
Howard, Joseph Henry	Hyannis.
Howe, George Dickinson	North Hadley.
Jones, Frank Waldo	South Scituate.
Joyner, Frank Hall	North Egremont.
Kingman, Morris Bird	Amherst.

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the College during any portion of the year 1881.

Kinney, Burton Arial	Lowell.
May, Frederick Goddard	Boston.
Morse, William Austin	Boston.
Myrick, Herbert	Concord.
Paige, James Breckenridge	Prescott.
Perkins, Dana Edson	Wakefield.
Plumb, Charles Sumner	Westfield.
Shiverick, Asa Frank	Woods Holl.
Stone, Winthrop Ellsworth	Amherst.
Taft, Levi Rawson	Mendon.
Taylor, Alfred Howland	Yarmouthport.
Thurston, Wilbur Herbert	Upton.
Wheeler, Henry Lewis	Great Barrington.
Wilder, John Emery	Lancaster.
Williams, James Stoddard	Glastonbury, Conn.
Wilmarth, Frederick Augustus	Upton.
Windsor, Joseph Libbey	Grafton.
Total	35

Junior Class.

Bagley, Sydney Currier	Boston.
Bishop, Edgar Allen	Diamond Hill, R.I.
Braune, Domingos Henrique	Nova Friburgo, Brazil.
Conger, Charles Thompson	New York City.
Fletcher, Frank Howard	Townsend.
Hevia, Alfred Armand	Havana, Cuba.
Holman, Samuel Morey	Attleborough.
Lindsey, Joseph Bridgeo	Marblehead.
Minott, Charles Walter	Westminster.
Nourse, David Oliver	Bolton.
Preston, Charles Henry	Danvers.
Selden, John Lincoln	Ashfield.
Wheeler, Homer Jay	Bolton.
Total	13

Sophomore Class.

Brown, Henry Clinton	Pittsfield.
Dickinson, Howard Wilmot	Amherst.
Dwight, Edwin Wells	Pittsfield.
Goessmann, Henry Edward Victor	Amherst.
Herms, Charles	Louisville, Ky.

Holland, Harry Dickinson	Amherst.
Jones, Elisha Adams	Rockville.
Lublin, Alfred William	New York City.
Mayo, Walter Parker	Wellesley.
Redding, Merton Jay	Amherst.
Smith, Llewellyn	Amherst.
Smith, William Henderson	Amherst.
Smith, William Ratliffe	Amherst.
Total	13

Freshman Class.

Allen, Edwin West	Amherst.
Almeida, Luciano José de	São Paulo, Brazil.
Barber, George Holcomb	Glastonbury, Conn.
Brooks, Paul Cuff Phelps	Boston.
Browne, Charles William	Salem.
Buffington, Charles Owen	Ware.
Cutter, Charles Sumner	Arlington.
Day, William Lyman	Warren.
Dickinson, John Francis	Amherst.
Howell, Hezekiah	Blooming Grove, N.Y.
March, Wilbur Marriam	Millbury.
Nichols, Andrew, jun.	Danvers.
Phelps, Charles Shepard	Florence.
Putnam, George Herbert	Millbury.
Spaulding, Charles Plumb	Amherst.
Spaulding, George Edwin	Billerica.
Tekirian, Benon Onnig	Yozgad, Turkey.
Whittemore, Joseph Sidney	Leicester.
Woodhull, George Gouge	Blooming Grove, N.Y.
Total	19

Select Class.

Cutler, George, jun.	Amherst.
Davis, Arthur Emmons	Amherst.
Fish, Charles Sumner	Boston.
Kendall, Charles Irving	Amherst.
Kenfield, Charles Robert	Amherst.
Owen, Henry Willard	Amherst.
Total	6

Post-Graduates.

Fairfield, B.S., Frank Hamilton (Boston Univ.)	Waltham.
Green, B.S., Samuel Bowdlear (Boston Univ.)	Chelsea.
Hills, B.S., Joseph Lawrence (Boston Univ.)	Boston.
Lovell, M.A., Henry Lyman (Amherst College)	Amherst.
Smith, B.S., Hiram Fred Markley . . .	North Hadley.
Stockbridge, B.S., Horace Edward (Boston Univ.)	Amherst.
Stone, B.S., Almon Humphrey . . .	Phillipston.
Washburn, B.S., John Hosea (Boston Univ.)	Bridgewater.
Total	8

Specials in Chemistry.

Cardoso, Peleusia	Rio Janeiro, Brazil.
Jaqueth, Isaac Samuel	Liverpool, N.Y.
Total	2

Summary.

Specials in Chemistry	2
Post-Graduates	8
Graduates of 1881	17
Senior Class	35
Junior Class	13
Sophomore Class	13
Freshman Class	19
Select Class	6
Total	113

GRADUATES.

- Allen, Gideon H., '71, Winsfield, Cowley Co., Kan., Agent, Wells, Fargo, & Co.'s Express.
- Bagley, David A., '76, Winchendon, Farmer.
- Baker, David E., '78, Franklin, Student, Harvard Medical School.
- Barrett, Joseph F., '75, 84 Broad St., New York City, Travelling Salesman, Bowker Fertilizer Co.
- Barri, John A., '75, 84 Broad St., New York City, Office Clerk, Bowker Fertilizer Co.
- Bassett, Andrew L., '71, New York City, Clerk, Vermont C. R.R. & Steamship Co.
- Bell, Burleigh C., '72, corner 16th and Howard Streets, San Francisco, Cal., Druggist and Chemist.
- Bellamy, John, '76, 659 Washington St., Boston, Nichols, Bellamy, & Co., Hardware and Cutlery.
- Benedict, John M., '74, 138 Second Avenue, New York City, Student of Medicine.
- Benson, David H., '77, South Weymouth, Superintendent of Acid Works, Bradley Fertilizer Co.
- Birnie, William P., '71, Springfield, Salesman, Birnie Paper Co.
- Blanchard, William H., '74, Westminster, Vt., Farm Laborer.
- Boutwell, Willie L., '78, Leverett, Farmer.
- Bowker, William H., '71, 43 Chatham St., Boston, President, Bowker Fertilizer Co.
- Bowman, Charles A., '81, Billerica, Farmer.
- Boynton, Charles E., '81, Great Falls, N.H., Student, law-office of Copeland & Edgley.
- Bragg, Everett B., '75, 84 Broad St., New York City, Buying Agent, Bowker Fertilizer Co.
- Brett, William F., '72, Brockton, Clerk, B. H. White & Co., Boston.
- Brewer, Charles, '77, 88 Worthington St., Springfield, Assistant Book-keeper, Troy Laundry.
- Brigham, Arthur A., '78, Marlborough, Farmer.
- Brooks, William P., '75, Sapporo, Japan, Professor of Agriculture and Farm Superintendent, Japan Agricultural College.

- Bunker, Madison, '75, 141 West 54th St., New York City, House Surgeon, American Veterinary College.
- Callender, Thomas R., '75, Grantville, Florist.
- Campbell, Frederick G., '75, West Westminster, Vt., Farmer.
- Carr, Walter F., '81, Boston, Student, Massachusetts Institute Technology.
- Caswell, Lilley B., '71, Athol, Civil Engineer and Farmer.
- Chandler, Edward P., '74, Abilene, Kan., Farmer.
- Chapin, Henry E., '81, Boylston, Teacher.
- Chickering, Darius O., '76, Enfield, Farmer.
- Choate, Edward C., '78, Southborough, Farmer.
- Clark, Atherton, '77, Grass Valley, Nevada Co., Cal., Assistant Manager, Menlo Gold Quartz Co.
- Clark, John W., '72, Amherst, Superintendent of Nurseries, Agricultural College.
- Clark, Xenos Y., '78, Oakland, Cal., Scientist.
- *Clay, Jabez W., '75.
- Coburn, Charles F., '78, Lowell, Teller, Five Cents Saving Bank, and Paragrapher, "Daily Citizen."
- Cowles, Frank C., '72, Amherst, Farmer.
- Cowles, Homer L., '71, Hadley, Farmer.
- †Curtis, Wolfred F., '74.
- Cutter, John C., '72, Sapporo, Japan, Professor of Natural Science, Japan Agricultural College.
- Deuel, Charles F., '76, Amherst, Druggist.
- Dickinson, Richard S., '79, Kankakee, Ill., Contractor, grading of railroads.
- Dodge, George R., '75, Brighton, Shipping Clerk, Bowker Fertilizer Co.
- Dyer, Edward N., '72, Kohala, S.I., Teacher.
- Easterbrook, Isaac H., '72, Diamond Hill, R.I., Farmer.
- Eldred, Frederick C., '73, 119 Chambers St., New York City, Salesman, Wilson Bros. Toy Co.
- Ellsworth, Emory A., '71, Holyoke, Architect, Civil and Mechanical Engineer with D. H. & A. B. Tower.
- Fairfield, Frank H., '81, Amherst, Post-Graduate, Agricultural College.
- Fisher, Jabez F., '71, Fitchburg, Local Freight Agent, Fitchburg Railroad.
- Fiske, Edward R., '72, 625 Chestnut St., Philadelphia, Penn., Merchant, Folwell, Bro., & Co.
- Flagg, Charles O., '72, Diamond Hill, R.I., Farmer.

* Died Oct. 1, 1880, of pneumonia, at New York City.

† Died Nov. 8, 1878, of inflammation of the brain, at Westminster.

- Flint, Charles L., jun., '81, 29 Newbury St., Boston, no business.
- Foote, Sanford D., '78, Springfield, Hampden Watch Co.
- Fowler, Alvan L., '80, Tombstone, Arizona, Superintendent, Wickenoc Mining Co.
- Fuller, George E., '71.
- Gladwin, Frederic E., '80, Tombstone, Arizona, Superintendent.
- Green, Samuel B., '79, Chelsea, no business.
- Grover, Richard B., '72, Ludlow, Vt., Clergyman.
- Guild, George W. M., '76.
- Hague, Henry, '75, Manville, R.I., Clergyman.
- Hall, Josiah N., '78, City Hospital, Boston, House Physician.
- Harwood, Peter M., '75, Barre, Farmer.
- Hashiguchi, Boonzo, '81, Tokio, Japan, Department of Agriculture.
- Hawley, Frank W., '71, Fayetteville, Ark., with S. A. Brown & Co., Lumber Dealers.
- Hawley, Joseph M., '76, Berlin, Wis., Banker, C. A. Mather & Co.
- Herrick, Frederick St. C., '71, Methuen, Farmer.
- Hibbard, Joseph R., '77, Stoughton, Wis., Farmer.
- Hills, Joseph L., '81, Amherst, Post-Graduate, Agricultural College.
- Hitchcock, Daniel G., '74, Warren, Agent American Express Co.
- Hobbs, John A., '74, Bloomington, Neb., Farmer.
- Holmes, Lemuel Le B., '72, Mattapoisett, Lawyer.
- Howe, Charles S., '78, Prescott, Arizona, Mining Expert.
- Howe, Elmer D., '81, Marlborough, Farmer.
- Howe, Waldo V., '77, Framingham, Agent, Framingham Brick Co.
- Hubbard, Henry F., '78, 94 Front St., New York City, with Jno. H. Catherwood & Co.
- Hunt, John F., '78, Guerrero, Mexico, care E. R. Larroche, Surveyor.
- Kendall, Hiram, '76, Providence, R.I., Chemist and Superintendent, Kendall Manufacturing Co.
- Kimball, Francis E., '72, 15 Union St., Worcester, Book-keeper, E. W. Vaill.
- Knapp, Walter H., '75, Grantville, Florist.
- Koch, Henry G. H., '78, Sixth Avenue and Twentieth Street, New York City, H. C. F. Koch & Son.
- Ladd, Thomas H., '76, care Wm. Dadmun, Watertown, no business.
- Lee, Lauren K., '75, Des Moines, Ia., Manager, Buffalo Linseed Oil Works.

- Lee, William G., '80, Grass Valley, Nev. Co., Cal., Miner.
Leland, Walter S., '73, Concord, Officer, State Prison.
Leonard, George, '71, Springfield, Lawyer.
Libby, Edgar H., '74, Chicago, Ill., Editor, "Farmer's Review."
Livermore, Russell W., '72, 9 and 11 Chamber of Commerce, Toledo, O., Attorney-at-Law.
Lovell, Charles O., '78, 178 Washington St., Boston, General Agent for James H. Earle, Publisher.
Lyman, Asahel H., '73, Manistee, Mich., Druggist and Bookseller.
Lyman, Charles E., '78, Middlefield, Conn., Farmer.
* Lyman, Henry, '74.
Lyman, Robert W., '71, Belchertown, Lawyer.
Mackie, George, '72, Attleborough, Physician.
Macleod, William A., '76, 60 Devonshire St., Boston, Patent Lawyer.
Mann, George H., '76, Sharon, Manufacturer.
Martin, William E., '76, Excelsior, Minn., Clerk in Post-Office.
Maynard, Samuel T., '72, Amherst, Professor of Botany and Horticulture, Massachusetts Agricultural College.
McConnel, Charles W., '76, 14 North Pearl St., Albany, N.Y., Dentist.
McQueen, Charles M., '80, Springfield, W. G. Medlieott & Co.
Miles, George M., '75, Miles City, Montana, Hardware Merchant and Real-Estate Dealer.
Mills, George W., '73, Medford, Physician.
Minor, John B., '73, New Britain, Conn., Clerk, Russell & Erwin Manufacturing Co.
Montague, Arthur H., '74, South Hadley, Farmer.
Morey, Herbert E., '72, 49 Haverhill St., Boston, Merchant, Morey, Smith, & Co.
Morse, James H., '71, 251 Essex St., Salem, Civil Engineer.
Myrick, Lockwood, '78, Tremont Bank Building, State St., Boston, Chemical Clerk, Pacific Guano Co.
Nichols, Lewis A., '71, San Diego, Cal., Civil Engineer.
Norcross, Arthur D., '71, Monson, Postmaster.
Nye, George E., '77, 70 Exchange Building, Union Stock Yards, Chicago, Ill., Book-keeper, G. F. Swift & Co.
Osgood, Frederick H., '78, Springfield, Veterinary Surgeon.
Otis, Harry P., '75, Leeds, Superintendent, Northampton Emery Wheel Co.
Page, Joel B., '71, Conway, Farmer.

* Died Jan. 8, 1879, of pneumonia, at Middlefield, Conn.

- Parker, George A., '76, Poughkeepsie, N.Y., Bailiff of "Cliffdale."
- Parker, George L., '76, Dorchester, Florist.
- Parker, Henry F., '77, 229 Broadway, New York City, Briesen & Betts. Student of Law at University of City of New York.
- Parker, William C., '80, Wakefield, Farmer.
- Peabody, William R., '72, Atchison, Kan., General Agent, Atchison, Topeka, & Santa Fé Railroad.
- Penhallow, David P., '73, 85 Brattle St., Cambridge, Lecturer on Botany.
- Peters, Austin, '81, 141 West 54th St., New York City, Student, American Veterinary College.
- Phelps, Charles H., '76, South Framingham, Florist.
- Phelps, Henry L., '74, Northampton, Dealer in Fertilizers.
- Porter, William H., '76, Hatfield, Farmer.
- Porto, Raymundo M. da S., '77, Para, Brazil, Planter.
- Potter, William S., '76, Lafayette, Ind., Lawyer.
- Rawson, Edward B., '81, Wilcox, Elk Co., Penn., Civil Engineer.
- Renshaw, James B., '73, Hutchinson, Minn., Clergyman.
- Rice, Frank H., '75, Aurora, Nev., Trader in Cattle.
- Richmond, Samuel H., '71, Altoona, Orange Co., Fla., Planter.
- Ripley, George A., '80, 5 Franklin St., Worcester, Dealer in Grain.
- Root, Joseph E., '76, Barre, Student of Medicine, New York City.
- Rudolph, Charles, '79, New York City, Student, Columbia Law School.
- Russell, William D., '71, Turner's Falls, Montague Paper Company.
- Salisbury, Frank B., '72, Kimberley Diamond Fields, South Africa, Trader.
- Sears, John M., '76, Ashfield, Farmer.
- Shaw, Elliot D., '72, Holyoke, Florist.
- Sherman, Walter A., '79, Long Island College, Brooklyn, N.Y., Student of Medicine.
- Simpson, Henry B., '73, Centreville, Md., Farmer.
- Smead, Edwin, '71, 223 North Cary St., Baltimore, Md., Dealer in Scrap Iron.
- Smith, Frank S., '74, Hampden, Woollen Manufacturer.
- Smith, George P., '79, Sunderland, Farmer.
- Smith, Hiram F. M., '81, Amherst, Post-Graduate, Agricultural College.
- Smith, Thomas E., '76, West Chesterfield, Manufacturer.
- Snow, George H., '72, Leominster, Farmer.

- Somers, Frederick M., '72, San Francisco, Cal., Newspaper Correspondent.
- * Southmayd, John E., '77.
- Southwick, Andre A., '75, Talladega, Ala., Instructor in Agriculture, Talladega College.
- Spalding, Abel W., '81, 907 North Main St., St. Louis, Mo., with Ripley & Kimball.
- Sparrow, Lewis A., '71, 43 Chatham St., Boston, Chemist, Bowker Fertilizer Co.
- Spofford, Amos L., '78, Georgetown, Shoe-cutter.
- Stockbridge, Horace E., '78, Germany, Student.
- Stone, Almon H., '80, Phillipston, Farmer.
- Strickland, George P., '71, Stillwater, Minn., Machinist, Seymour, Sabin, & Co.
- Swan, Roscoe W., '79, Framingham, Student, Harvard Medical School.
- Taft, Cyrus A., '76, Whitinsville, Machinist.
- Taylor, Frederick P., '81, Hartford, Conn., Foreman, Vine Hill Farm.
- Thompson, Edgar E., '71, East Weymouth, Teacher.
- Thompson, Samuel C., '72, Natick, Civil Engineer.
- Tucker, George H., '71, Fargo, Dakota, Civil Engineer.
- Tuckerman, Frederick, '78, Hotel Brunswick, Boston, Student, Harvard Medical School.
- Urner, George P., '76, 116 Franklin Street, New York City, Superintendent, Magic Ruffle Co.
- Wakefield, Albert T., '73, Peoria, Ill., Physician.
- Waldron, Hiram E. B., '79, North Rochester, Farmer.
- Ware, Willard C., '71, 255 Middle Street, Portland, Me., Manager, Boston & Portland Clothing Co.
- Warner, Clarence D., '81, Providence, R.I., Teacher, Rhode Island State Reform School.
- Warner, Seth S., '73, 43 Chatham Street, Boston, Travelling Salesman, Bowker Fertilizer Co.
- Washburn, John H., '78, Amherst, Post-Graduate, Agricultural College.
- Webb, James H., '73, 20 Exchange Building, New Haven, Conn., Attorney-at-Law.
- Wellington, Charles, '73, Germany, Student.
- Wells, Henry, '72, Rochester, N.Y., Clerk, "Blue Line," Fast-Freight Office.
- Wetmore, Howard G., '76, 3 East 17th Street, New York City, Physician.

* Died Dec. 11, 1878, of consumption, at Minneapolis, Minn.

- Wheeler, William, '71, 70 Kilby Street, Boston, President,
Wheeler Reflector Co.
- Whitney, Frank Le P., '71.
- Whitney, William C., '72, Minneapolis, Minn., Architect.
- Whittaker, Arthur, '81, Needham, Farmer.
- Wilcox, Henry H., '81, Nawiliwili, S.I., Sugar industry.
- Williams, John E., '76, Amherst, Editor, "Record."
- Winchester, John F., '75, Lawrence, Veterinary Surgeon and Lec-
turer, Massachusetts Agricultural College.
- Wood, Frank W., '73, Providence, R.I., Civil Engineer.
- Woodbury, Rufus P., '78, Kansas City, Mo., News and Telegraph
Editor of "Kansas City Daily Times."
- Woodman, Edward E., '74, Danvers, Florist, E. & C. Woodman.
- Wyman, Joseph, '77, 68 Belmont Ave., Boston, Produce Dealer.
- Zeller, Harrie McK., '74, Hagerstown, Md., Student of Teleg-
raphy.

COURSE OF STUDY AND TRAINING.

FRESHMAN YEAR.

First Term. — Chemistry, 3 hours each week ; Human Anatomy, Physiology, and Hygiene, 3 hours ; Algebra, 5 hours ; English, 2 hours ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Recitation in Tactics, 1 hour ; Manual Labor, 6 hours.

Second Term. — Inorganic Chemistry, 3 hours ; Botany, 3 hours ; Geometry, 5 hours ; Agriculture, 3 hours ; English, 2 hours ; Elocution, 1 hour ; Freehand Drawing, 3 hours ; Military Drill, 3 hours.

Third Term. — Systematic Botany, 4 hours ; Geometry, 4 hours ; French, 5 hours ; Elocution, 2 hours ; Agriculture, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SOPHOMORE YEAR.

First Term. — Systematic Botany, 3 hours each week ; Geometry, 4 hours ; French, 5 hours ; English, 1 hour ; Agriculture, 2 hours ; Declamation, 1 hour ; Military Drill, 4 hours ; Recitation in Tactics, 1 hour ; Manual Labor, 6 hours.

Second Term. — Geology, 3 hours ; Trigonometry, 5 hours ; French, 4 hours ; English, 1 hour ; Agriculture, 3 hours ; Declamation, 1 hour ; Drawing, 3 hours ; Military Drill, 3 hours.

Third Term. — Zoölogy, 5 hours ; Surveying, 5 hours ; Agriculture, 2 hours ; Lectures in History, 3 hours ; Declamation, 1 hour ; Levelling, 3 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

JUNIOR YEAR.

First Term. — German, 5 hours each week ; Mechanics, 5 hours ; Entomology, 2 hours ; Market-Gardening, 2 hours ; Horticulture, 2 hours ; Military Drill, 3 hours ; Recitation in Tactics, 1 hour ; Manual Labor, 6 hours.

Second Term. — German, 4 hours ; Physics, 5 hours ; Practical Chemistry, 9 hours ; Drawing, 3 hours ; Agricultural Debate, 1 hour ; Declamation, 1 hour ; Military Drill, 3 hours.

Third Term. — German, 4 hours ; Roads and Railroads, 4 hours ;

Practical Chemistry, 9 hours ; Declamation, 1 hour ; Stock and Dairy Farming, 2 hours ; Military Drill, 4 hours ; Manual Labor, 6 hours.

SENIOR YEAR.

First Term. — Lectures in History, 4 hours each week ; Practical Chemistry, 7 hours ; Book-keeping, 2 hours ; Astronomy, 3 hours ; Military Science, 2 hours ; Original Declamation, 1 hour ; Military Drill, 3 hours.

Second Term. — English Literature, 4 hours ; Theses, 1 hour ; Mental Science, 4 hours ; Agriculture, 2 hours ; Veterinary Science, 3 hours ; Military Science, 2 hours ; Microscopy, 4 hours ; Military Drill, 3 hours.

Third Term. — Veterinary Science, 2 hours ; Military Science, 2 hours ; Botany, 3 hours ; Landscape-Gardening, 3 hours ; Rural Law, 1 hour ; English Literature, 3 hours ; Agricultural Review, 4 hours ; Military Drill, 4 hours.

CALENDAR FOR 1882.

The third term of the collegiate year begins March 23, and continues till June 21.

The first term begins Aug. 24, and continues till Nov. 22.

The second term begins Dec. 7, and continues till March 7, 1883.

There will be an examination of candidates for admission to the College, at the Botanic Museum, at 9 A.M., Tuesday, June 20, and also on Thursday, Aug. 24.

The Farnsworth Prize Declamations take place Monday evening, June 19.

The public examination of the graduating class for the Grinnell Prize for excellence in agriculture, and the examination of the other classes in the studies of the term, will take place on Tuesday forenoon, June 20.

The exercises of Graduation Day occur June 21.

ADMISSION.

Candidates for admission to the Freshman Class are examined, orally and in writing, upon the following subjects : English Grammar, Geography, Arithmetic, Algebra through simple equations, and the History of the United States.

Candidates for higher standing are examined as above, and also

in the studies gone over by the class to which they may desire admission.

No one can be admitted to the College until he is fifteen years of age; and every student is required to furnish a certificate of good character from his late pastor or teacher, and to give security for the prompt payment of term-bills. Tuition and room-rent must be paid in advance at the beginning of each term, and bills for board, fuel, etc., at the end of every term.

The regular examinations for admission are held at the Botanic Museum, at nine o'clock A.M., Tuesday, June 21, and on Thursday, Aug. 25; but candidates may be examined and admitted at any other time in the year.

EXPENSES.

Tuition	\$12 00 per term.
Room-rent	\$5 00 to 10 00 "
Board	2 50 to 3 50 per week.
Expenses of chemical laboratory to students of practical chemistry	10 00 per term.
Public and private damages, including value of chemical apparatus destroyed or injured . . .	At cost.
Annual expenses, including books . . .	\$250 00 to \$350 00

REMARKS.

The regular course of study occupies four years; and those who complete it receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the College may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the College, thereby becoming entitled to all the privileges of its alumni.

The instruction in the languages is intended to qualify the graduates to write and speak English with correctness and effect, and to translate French with facility. The scientific course is as thorough and practical as possible, and every science is taught with constant reference to its application to agriculture and the wants of the farmer.

The instruction in agriculture and horticulture includes every branch of farming and gardening which is practised in Massa-

chusetts, and is both theoretical and practical. Each topic is discussed thoroughly in the lecture-room, and again in the plant-house or field, where every student is obliged to labor. The amount of required work, however, is limited to six hours per week, in order that it may not interfere with study. Students are allowed to do additional work for wages, provided they maintain the necessary rank as scholars.

Indigent students are allowed to do such work as may offer about the College or farm buildings, or in the field; but it is hardly possible for one to earn more than from fifty to one hundred dollars per annum, besides performing other duties. So far as is consistent with circumstances, students will be permitted to select such varieties of labor as they may, for special reasons, desire to engage in.

Those who pursue a select course attend recitations and lectures with the regular classes; but those properly qualified, who desire special instruction in botany, chemistry, civil engineering, veterinary science, agriculture, or horticulture, may make private arrangements with the officers having charge of these departments.

An expenditure of from ten to fifty dollars is necessary to provide furniture, which may be purchased at reasonable rates, either new or second-hand. At the beginning of the second term of attendance each student is required to provide himself with the full uniform prescribed for the battalion of Agricultural Cadets, the cost of which is about thirty dollars.

On Sundays students are required to attend church in the forenoon, and invited to join a class for the study of the Bible in the afternoon. They will be permitted to select their place of attendance from among the churches in the town, of the following denominations: viz., Baptist, Congregational, Protestant Episcopal, Methodist Episcopal, and Roman Catholic.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the College or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the Faculty in their respective departments.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The library of the College contains about two thousand volumes. Among them are several sets of cyclopaedias, magazines, and newspapers, reports of agricultural societies, and State boards of agriculture, and many standard works on agriculture and horticulture. There are also many useful works of reference in chemistry, botany, surveying, and drawing.

The Faculty and students also have the privilege of drawing books from the excellent library of Amherst College, which contains over thirty thousand volumes.

The State cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the College, and is of much value for purposes of instruction.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods, and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About fifteen hundred species and varieties of plants are cultivated in the Durfee Plant-House, affording much pleasure and information to students and visitors.

The class in microscopy has the use of seven of Tolles's best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

PRIZES.

FARNSWORTH RHETORICAL MEDALS.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, which is to be used for the purchase of gold and silver medals, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Clafin of Boston has given the sum of one thousand dollars for the endowment of a first prize of fifty dollars, and a second prize of thirty dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members

of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILLS BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1880, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

REGULATIONS.

I.—Students are forbidden to combine for the purpose of absenting themselves from any required exercise, or violating any known regulation of the College.

II.—The roll shall be called five minutes after the ringing of the bell for each exercise of the College, by the officer in charge, unless a monitor be employed; and students who do not answer to their names will be marked absent, provided that any student coming in after his name has been called shall be marked tardy. Two tardinesses shall be reckoned as one absence.

III.—Absence from a single exercise may be allowed or excused by the officer in charge of the same, if requested beforehand; but permission to be absent from several exercises must be obtained in advance from the general excusing officer, or from the president. In such cases the officer excusing will furnish a certificate of excuse, which shall state the precise time for which absence is permitted, and which shall be a satisfactory reason for absence from all exercises occurring within the time specified.

IV.—Excuse for absence from a College exercise must be obtained before the same occurs; and no excuse will be granted afterwards, unless the student shows the cause of the absence to be one of imperative necessity, and which could not be foreseen or prevented.

Permission to be absent from several consecutive exercises must be obtained from the excusing officer or the president; but excuse for absence from a single exercise *must* be obtained of the officer in charge of the same.

Permission for absence by the excusing officer or president will be given in the form of a certificate, the recipient of which must exhibit the same to each officer from whose exercise it gives leave of absence, as soon as the first exercise of the officer at which he is thereafter present; and his failure to do so will annul his right to excuse from the exercise of such officer.

A record of all tardinesses will be rigidly kept; and, unless excused by the officer with whom they occur, two such will be entered on the record as an unexcused absence.

Each unexcused absence will be considered disobedience to College rule; and, if the aggregate number of such absences in all departments reaches *two*, the student so delinquent shall be informed of the fact. If the number of such absences reaches *four*, the parent or guardian of the student shall be informed of his delinquencies; and, if *five* such delinquencies are justly recorded against any student, his connection with the College may be terminated.

V.—Students are forbidden to absent themselves without excuse from the regular examinations, to give up any study without permission from the president, or to remove from one room to another without authority from the officer in charge of the dormitory buildings; and no student shall be permitted to make such change until he has procured from the inspecting officer a written statement that the room about to be vacated is in perfect order.

VI.—Students shall be required to attend the church of their selection regularly on Sunday morning, and report in writing to the excusing officer, during the ensuing week, whether they attended or not.

VII.—The record of deportment, scholarship, and attendance will be carefully kept; and, whenever the average rank of a student falls below fifty, he will not be allowed to remain a member of the College, except by a special vote of the Faculty. Admission to the College, and promotion from class to class, as well as to graduation, are granted only by vote of the Faculty.

VIII.—Students are required to abstain from any thing injurious to the buildings and other property of the College, and in all respects to conduct themselves with propriety.

IX.—Parents and guardians are specially urged to co-operate with the Faculty in securing the faithful attendance of students upon every appointed exercise of the College.

X.—Military drill must be continued to graduation; and any student who neglects this exercise any part of graduation week, will not be entitled to a recommendation for a College diploma.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given: In the south dormitory the main corner-rooms are fifteen by eighteen feet, and the adjoin-

ing bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner-rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

SCHOLARSHIPS.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

The Trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter College with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture. To every such student the cash value of a scholarship is one hundred and forty-four dollars.

Statement of Cash Receipts and Payments for the Year 1881.

		<i>Receipts.</i>	<i>Payments.</i>
1881.	Jan. 1,	Balance on hand	\$1,238 01
		Income from endowment-fund	12,958 18
		from term-bills	4,601 31
		from farm-produce	1,614 15
		from plant-house and nursery	2,480 69
		from Mary Robinson Fund	70 00
		Farnsworth Prize Fund	100 00
		Grimmell Prize Fund	60 00
		Whiting Street Fund	80 00
		from Hills Fund	597 38
		from laboratory account	1,045 79
		Expenses, —	
		Farm account	
		Botanical account	
		Term-bill account	
		Expense account	
		Hills Fund	
		Laboratory account	
		Salaries	
		Farnsworth Prize Fund	
		Grimmell Prize Fund	
		Balance	
			\$24,845 51
			\$3,052 63
			2,325 59
			1,203 19
			3,342 39
			466 66
			908 73
			11,137 00
			65 00
			80 00
			\$22,581 19
			2,264 32
			\$24,845 51

SUNDRIES DR. TO MASSACHUSETTS AGRICULTURAL COLLEGE, JAN. 1,
1882.

Real estate	\$200,000 00
Live-stock account	5,182 00
Implements and vehicles account	1,842 00
Farm account for produce on hand	3,240 00
	————— \$210,264 00

HOUSE.....

.....No. 325.

TWENTIETH ANNUAL REPORT
OF THE
MASSACHUSETTS
AGRICULTURAL COLLEGE.

JANUARY, 1883.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE,
1883.

HOUSE.....

.....No. 325.

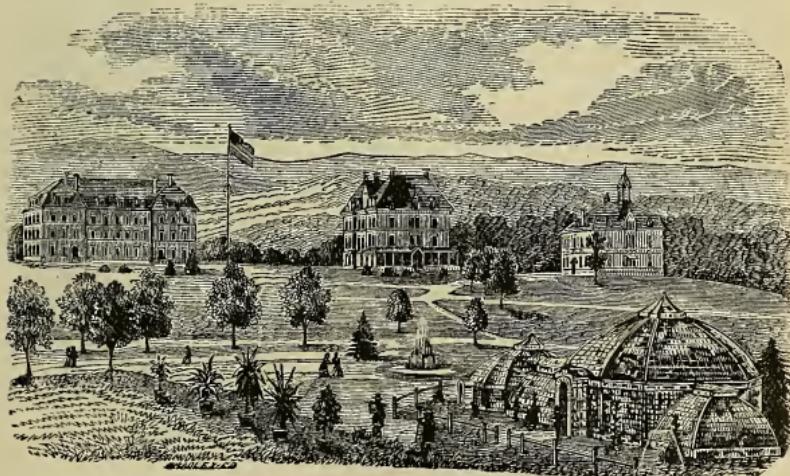
TWENTIETH ANNUAL REPORT

OF THE

MASSACHUSETTS

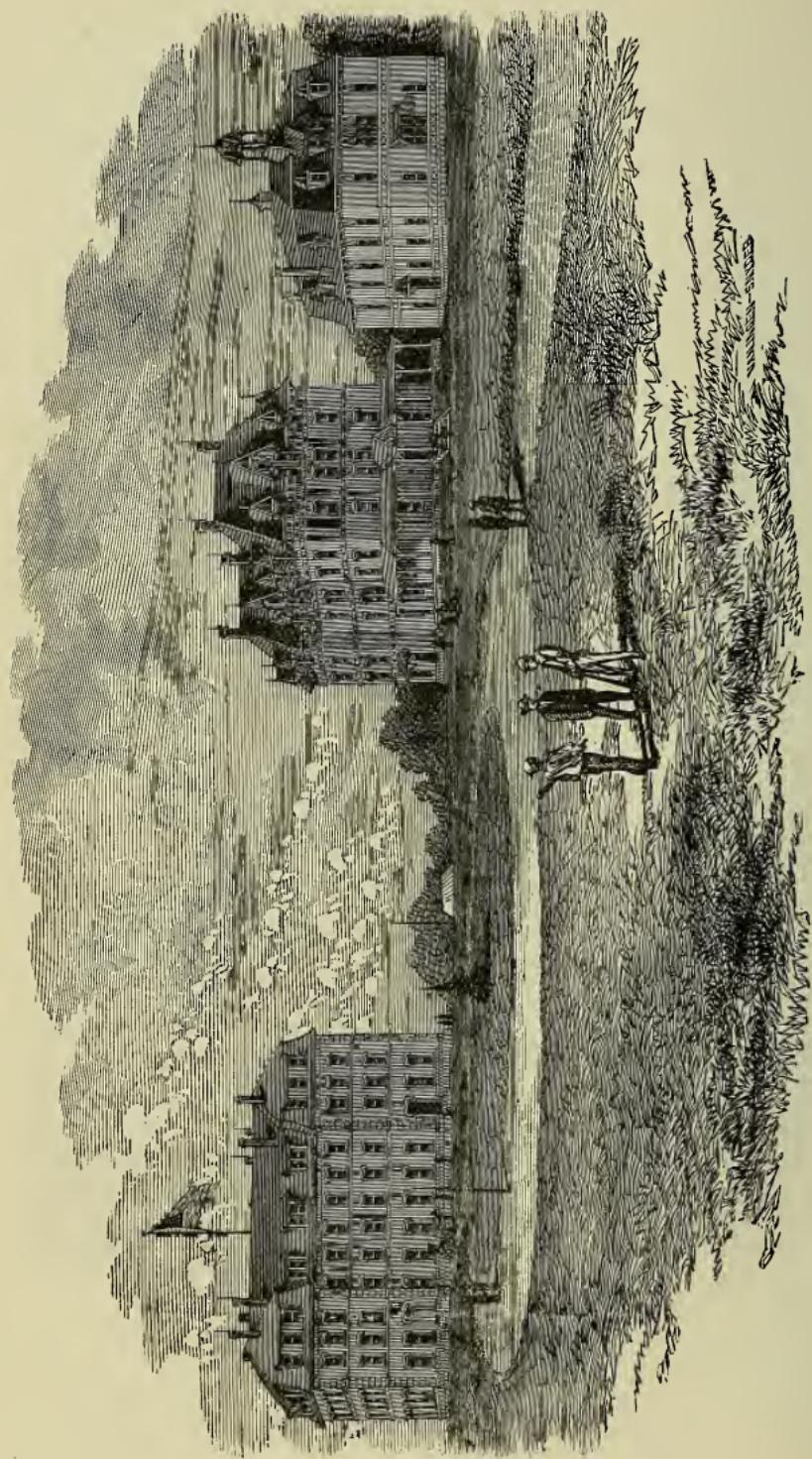
AGRICULTURAL COLLEGE.

JANUARY, 1883.



BOSTON:

WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
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1883.



Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT,

BOSTON, February 23, 1883.

To the Honorable the House of Representatives :

I have the honor to transmit herewith the twentieth annual report of the trustees of the Massachusetts Agricultural College, and in so doing I take leave to more than make a formal transmission of that document to the House. I especially call attention to its contents, and submit that in the opinion of the Executive it would be for the benefit of the people of the Commonwealth, that a very considerable number of copies of it should be printed and widely distributed.

I am convinced, both from the state of my own knowledge heretofore, of the Agricultural College, and from conversation with several gentlemen of intelligence, that that institution is entirely misunderstood as to its purposes, its methods of instruction and the scope of its educational power. A too commonly received opinion seems to be that at that college only some information is imparted to the pupil concerning soils, the methods of treating them, and the practical work of the farm, and therefore that only sons of farmers, or those who are intending to devote their lives to farming, should seek to obtain an education therein. While it is true that these things are taught and well taught therein, they are by no means the limit of the educational course.

For practical instruction, to every branch of professional life except perhaps theology, the *curriculum*, and the methods of imparting knowledge to the pupil, are as beneficial as those of any other institution of learning. In addition, the

lements of military science, so far as the "school of the soldier," and the officer of the battalion are concerned, are imparted to the pupil, and he is fitted, if attentive and apt, to take a commission in any regiment, practically quite as well in so far as if from West Point.

The instruction in the order of business, in neatness and care of the person, in habits of cleanliness in the care of apartments wherein men live, which are the embodied results of the experience of all armies, are as useful to the civilian who shall have the care of others, especially if dependents, as they are to the officer in the care of his men. From experimental knowledge I testify to the value of this branch of instruction.

From the economy which can well be practised by the student at the Agricultural College, because of the cheapness of living, the absence of those inducements to extraordinary expenses by the pupil which render a college course so burdensome to men of moderate means, the sons of such men will be enabled either by their own exertions, or the support of their parents, to obtain at a cost within their reach a good practical education, as good in my judgment as anywhere else to fit them for the business of life.

I commend, therefore, this institution, founded both by endowment by the United States and the State, to the attention of the legislature, and ask for it such appropriations as may meet its very economical needs.

BENJ. F. BUTLER.

Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Jan. 30, 1883.

To His Excellency BENJAMIN F. BUTLER:

SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Twentieth Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,
Your obedient servant,

P. A. CHADBOURNE,
President.

INDEX.

	PAGE
Educational Plan of the College,	16
Repairs,	17
Improvements,	18
Wants of the College,	19
Report of D. H. Tillson,	21
Botanic Department,	23
Mathematics and Physics,	27
Report of the Military Department,	30
Catalogue of Trustees, Overseers, Faculty and Students,	35
Course of Study and Training,	43
Practical Agriculture,	45
Report of the Department of English and the Modern Languages,	53
Calendar for 1883,	58
Admission,	58
Expenses,	59
Extra Expenses,	60
Size of Rooms,	60
Scholarship,	60
Post-Graduate Course,	61
Books, Apparatus, and Specimens in Natural History,	61
Prizes,	62
Regulations,	62
Treasurer's Account,	64

ANNUAL REPORT

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

To His Excellency the Governor and the Honorable Council :

Since the last report was made, important changes have occurred among the officers of government and instruction in the college. Edward C. Choate of Southborough has been elected trustee in place of William Wheeler, resigned. Both of these gentlemen are graduates of the college. The resignation of the Hon. Levi Stockbridge, as president, has removed from the college one who has been identified with it from the beginning, and who, by his long and successful labors here, has won for himself a high position among the agriculturists and educators of the country. His place was filled by the election of P. A. Chadbourne, late president of Williams College and formerly president of this institution. Mr. A. B. Bassett has been elected to the chair of mathematics and physics, and is performing his work with marked skill and success. The chair of agriculture, left vacant by the resignation of President Stockbridge, has been temporarily filled in a very acceptable manner by Mr. John W. Clark. Dr. Manly Miles, formerly of the Michigan Agricultural College, has been elected to this chair and commences his instruction the present term. Mr. Clark will continue as associate instructor in agriculture, having care of the class work in the field. Robert W. Lyman, Esq., of Belchertown, a graduate of the college, has given instruction in rural law, and Dr. Edward Hitchcock, Jr., in

elocution. The president has given instruction in general zoölogy, entomology, and mental philosophy. In the present year he is also to give instruction in geology. He also conducts religious worship on the Sabbath in the college chapel. The other departments of instruction remain as they were at the time of the last report.

The course of study has been so far modified as to introduce more instruction in the structure of the English language, rhetoric and history. The study of French and German heretofore required has been made optional, and the time of recitations so arranged that each student can study both languages if he so elects.

The work of the college has been most efficiently done. The improvement of the students in their studies and in that good order and gentlemanly deportment so desirable in college, has been highly satisfactory.

While we could use to great advantage much larger means than we have, and should have the assistance of specialists in different departments of science, which our limited means do not warrant us now in securing, we should be false to the best interests of the college, as well as ungrateful towards the nation and Commonwealth, if we did not fairly recognize what they have already done in making this college an efficient agency in the work of practical, liberal education. In seeking for more which is needful, we have perhaps too much lost sight of, or kept from the public view, what we now have.

It is plainly evident that the people of the State, as a whole, have not understood the provisions here made for the education of the young men of Massachusetts. When committees from the legislature and others have visited the institution and become acquainted with its organization, its means of instruction, and its actual work, the college has proved its own best advocate. To make the college and its work better known to all the people of the State, we ask a careful consideration of the course of study and of the reports of various departments. We also feel justified in once more calling the attention of the legislature and the people of the State to the founding and organization of this institution as well as to its present condition.

The grant of land and land-scrip for founding agricultural colleges was made by the general government in 1862. The civil war had brought out with great clearness the elements of national strength, — varied production in agriculture and the mechanic arts, and a citizen soldiery well trained in the art of war. To secure all these in their greatest perfection, was the aim of the bill for establishing “Industrial Colleges” in the various loyal States. Whatever mistakes may have been made in the organization and management of these institutions, no fault can be charged home to the original bill. It was eminently a wise measure, and suggested an outline of organization and management that has not as yet been improved upon. Its significant words are as follows: “The endowment, support and maintenance of at least one college where the *leading object* shall be, without excluding scientific and classical studies, and including military tactics, to teach such branches of learning as are *related* to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the *liberal* and *practical* education of the industrial classes in the several pursuits and professions of life.” No branch of learning peculiar to the old colleges was to be necessarily excluded; but the new colleges were to push on to the practical application of the sciences they taught, and they were to train all their students as defenders of their country against domestic rebellion or foreign invasion. In a word, they were to educate their students as *men* and as *American citizens*. The rank of the education given is “*liberal*,” the term applied to the education given by the highest institutions then known. It was to be so broad as to fit men for the “several pursuits and professions of life.” The object of these colleges was to obliterate the supposed superiority of the so-called “learned professions,” by securing a “*liberal*,” that is, the highest education, for those who chose industrial pursuits, thus lifting agriculture and the mechanic arts from the plane of mere routine labor to the dignity of learned professions, founded upon scientific knowledge and allied to, or connected with, those branches of learning essential for a broad and generous culture of the whole man. Many who have attempted the management of these col-

leges, as well as many who have criticised them, have apparently overlooked the broad and generous plan upon which they were founded. It is doubtful if they will ever accomplish the great work for which they were intended, until their original purpose is so fully and constantly recognized and carried out by judicious, painstaking work, that the currents of education shall be once fairly turned toward these new channels. When once fairly turned, that they will continue to flow can no more be doubted than we can doubt the success of any natural process when not artificially obstructed. An education that "gives boys what they need to daily use when they become men," commends itself as rational and practical. All true education should aim at this. And this certainly is the idea that is embodied in the bill founding the industrial colleges of the several States. The provisions of this bill were accepted by Massachusetts. One-third of the funds received from the United States was given to the Institute of Technology in Boston for the promotion of the mechanic arts, and two-thirds were devoted to founding a college at Amherst for the special work of agriculture. By the gift to the Institute of Technology, the Agricultural College has been freed from much labor in building up a mechanical department,—a fact that has been lost sight of by some,—and is left free to carry out the idea of a college making agriculture the leading idea, while it secures rigid training in military tactics and provides such a range of studies in science, literature and philosophy, as shall, in the words of the bill, promote "*liberal education.*"

The college now has $383\frac{1}{2}$ acres of land for farm, gardens, nurseries, etc. It has college buildings, laboratory, botanic museum, plant-houses, gardens and nurseries, so that provision is made for teaching all the sciences that relate to the cultivation of the soil, and these sciences are practically applied to all the work of the farm, garden, vineyard and orchard. The Durfee plant-house and propagating houses afford practical instruction the year round.

The course of study aims to do what the original bill declared should be done,—give a practical knowledge of agriculture and horticulture, and at the same time so educate the *man*, that the students from the Agricultural College

shall not be mere artisans, having learned a trade or business and nothing more, but be liberally educated, so that, as farmers, they shall rank in intellectual training with those who chose what have heretofore been called the “learned professions.” It is plain that farming will never take its true place, nor farmers have that influence in the government of our land which they ought to have, until they take their place with those in other professions, not only as men of power and practical ability, but as men of learning and culture. Those who claim that the farmer’s life forbids this result, have never yet fully appreciated the farm as a place for study and thought, as well as a place for labor.

The course of study in the Massachusetts Agricultural College, at the present time, embraces the following topics:—

1. *Lectures on Health and Habits of study*, and general plan of the college work. These lectures are now given by the president. The student, as he begins his college work, is instructed as to the best means of preserving health, the best methods of study and of recitation to secure knowledge, and the best mental training at the same time. He has laid before him the studies of the whole course, so far as he then is able to understand them, that he may in the beginning have some just idea of the value of the different studies, may understand why they come in the order they do, and how they make a complete educational whole to secure the purpose for which the college exists.

2. *Botany*—structural and systematic—special application to cultivated plants—*Microscopy*.

3. *Zoölogy*—systematic, with special studies in *Entomology*.

4. *Agriculture*—extending through the entire course of four years—study of soils—methods of working—fertilizers—draining—farm implements—special crops, etc. *Stock* and *Dairy Farming*, with lectures on *Veterinary Science*. *Work on the Farm* under direction of the Professor of Agriculture, six hours a week, when such work can be supplied.

5. *Horticulture*. Market Gardening—Arboriculture, Care of Nurseries—Landscape Gardening. Work in nurseries,

propagating houses and vineyard done under direction of Professor of Horticulture.

6. *Chemistry.* Theoretical and practical. Work in Laboratory, Junior and Senior years, under direction of the Professor of Chemistry.

7. *Geology and Mineralogy,* with special reference to Agriculture. The origin of soils, location of Artesian wells, etc.

8. *Military Science* and *Military Drill* continued through the whole course under direction of officers of the Regular Army, detailed by the United States Government for this special service. This includes weekly inspection of all halls and rooms in college buildings, thus securing neatness and proper sanitary conditions. The students of the college when graduated are competent, in their military knowledge, to receive commissions in the Regular Army.

9. *Mathematics* — Algebra, Geometry, Trigonometry and its application, Mechanics, Physics and Astronomy.

10. *English Literature, History, Constitution of the United States, Elocution, Essay Writing and Debates, Book-Keeping, Drawing.*

11. *Rural Law, Outlines of Mental and Moral Science.*

12. *French and German Languages.*

This is a brief outline of studies, without any attempt at systematic arrangement, as they are given in the curriculum of terms. Other subjects are introduced as circumstances favor. To some of the subjects here named, but little time can be given, and this varies with different classes; but to those studies, like Botany, Chemistry, Agriculture and Horticulture, which are the practical studies of the course, the time and strength of the student are specially given.

The course of study is so arranged that students may be absent from the college during the spring and summer, and yet go on with their classes. The studies of the first and second terms of each year make a connected course, or one which the student can complete by a moderate amount of study while absent in the summer. Students who complete this partial course receive certificates, but not the regular degree of Bachelor of Science.

In addition to the college proper, the work of which henceforth will be mainly that of instruction, the State has now established an experiment station which will give to the student a constant acquaintance with the methods and results of agricultural experimenting under the direction of the most competent men the board of control can employ. The college can use to advantage larger funds than it has. In many directions, increased funds are absolutely essential for carrying out the true idea of the college.

The apparent income, as shown by the treasurer's report, is quite delusive. Several of the items generally given there represent the amount of business done by the farm and department of horticulture, rather than income for support of the institution. The net income is very small, while the work of instruction in practical science is very great, much greater than in an ordinary classical college that has no special scientific department. Small classes require the same amount of instruction as large ones.

The farm and department of horticulture are both subjected to large expense in the care of roads, grounds, plant-houses, etc., all of which must be kept in order for the credit of the institution, and as a means of instruction in practical work. This special care and ornamental of grounds is provided for in most institutions by special funds. Here this expense, which is very large, is charged to the departments.. They are thus made accountable for expense that does not properly belong to them. This gives their products an apparent cost which misrepresents the real state of the case. An attempt will be made to separate these items of expense, so that the real working of the farm and horticultural department shall be more clearly seen.

We feel the need of larger funds for every department of college work. We must look to private individuals as well as to the State for the aid the college must have to sustain and increase its efficiency, and make it second to none in the facilities it offers. While money is given so freely to educate men away from productive pursuits, it is certainly strange that in Massachusetts not a dollar has yet been given by private benevolence for the endowment of a chair of instruction in the Massachusetts Agricultural College, — an

institution founded to fit men to become intelligent producers in time of peace, and efficient defenders of the State and Union in time of war. When all the legislators and citizens understand the true state of the case, we believe that the Massachusetts Agricultural College will never lack for students or the funds needful for carrying on this institution founded by the joint action of the United States and the Commonwealth of Massachusetts.

EDUCATIONAL PLAN OF THE COLLEGE.

For the outline of studies and the special work in each department, we refer to the course of study, and the tabulated report of work in each department in the second part of this report.

It is the aim of the trustees to keep the requirements for entrance such that every boy in the State can find facilities for fitting himself for the college, without leaving his home, or incurring any expense for schooling which the well-ordered schools of the various towns cannot afford. If boys from fifteen to twenty years of age come with a good common-school education and give themselves heartily to the work here presented for them, they will, in four years' time, be well educated to begin any practical business of life.

The expense of education for four years is a serious matter for most farmers' sons. The other colleges have large funds for aiding indigent students, and a large proportion of those thus aided are as well able to pay their bills as the average farmer's son. It should be the aim of this college, then, to reduce as much as possible the college expenses, and to foster habits of economy among the students themselves. It now furnishes free scholarships, but it has no funds except a single scholarship to make good the loss of tuition. So that while the college diminishes the expense of the student, it diminishes its own power to do for him what ought to be done. Professors can do double work for a time, but there is a limit to their time and strength, and to their ability to properly teach so many subjects as are now required of them.

From necessity the college makes provision for the board of students, and it secures this at reduced cost by giving

rent free the boarding-house and its furniture. The necessity for this provision arises from the fact that the college is so far removed from the thickly settled portion of the town that boarding places are difficult to be obtained within reasonable distance from the college grounds.

REPAIRS.

The legislature of 1882 granted to the college \$4,000 for repairs. This money has been expended and the bills deposited with the treasurer of the State. The farm buildings have been repaired and painted; the laboratory repaired and painted, and provided with cases for proper protection of apparatus and specimens. The botanic museum has been painted outside and in. The lecture-room repaired and provided with cases for protection of specimens and instruments. The Durfee plant-house and propagating houses have been thoroughly repaired and painted. The heat and moisture in those houses had caused more serious damage than at first appeared. The farm-house now occupied by the market gardener has been shingled and otherwise repaired. The barns connected with this house have been remodelled and repaired for the use of the horticultural department, and the professor's house, to be occupied by Prof. Miles, has been repaired, painted and papered. All of these buildings from long neglect of repairs from want of means had become in many places unsightly and hardly fit for occupation. They are now essentially in good order, though much more might have been done to most of them with great profit, had the appropriation allowed. As is generally the case, the work proved more formidable than it appeared before it was begun. The carpenter in charge gave entire satisfaction, and we believe every dollar of the money has been judiciously expended. It would require at least \$1,000 to complete the repairs upon the buildings, including the painting of the roofs which would be economy in the end.

It was supposed by the trustees that the Cowles buildings would be taken and repaired by the board of control of the experiment station. No estimate was therefore made for their repairs. If these buildings are not taken by the experi-

ment station, they can be made of great service to the college for the assistant professor of agriculture. It will require \$2,000 to put them in proper order for college use.

IMPROVEMENTS.

The unsightly gravel-pit near the road has been filled at large expense, and other important improvements have been made as indicated in the farm and horticultural reports.

Mr. Danforth K. Bangs has given to the college three-fourths of an acre of land at the intersection of the two roads that cross the college grounds from the south. This piece of land, rough, neglected and unsightly, was a great injury to the appearance of the college property. By this generous gift of Mr. Bangs, we have been able to transform this piece of land to a small ornamental park, so that the entrance to our grounds is now marked by the appearance of ornamentation and culture, instead of roughness and neglect.

The plan henceforth will be to concentrate the farm-work near the roads and farm buildings, and spend less money upon the pastures and swamps, till we have more to expend. Much of such labor gives very slow returns, and much of this kind of labor is still to be done on this farm. With so much land to be cared for by the work of students and by hired help, it is a very difficult problem to gain profit while trying to use the farm as a means of education. Much labor upon it has thus far been like labor in the laboratory, without any direct pecuniary profit. Now that the experiment station is to take the burden of experimenting, the farm-work should be narrowed to that limit that it can be done with profit. The position of the college, away from markets, renders the work more difficult for both the farm and garden than it would be were the institution near some large city affording a ready market for the most profitable crops.

Notwithstanding the improvements made, involving large expense, and the loss on nearly all crops in consequence of the unprecedented drought, the expenses of the college as a whole have been kept within its income. If we add to the reported balance \$1,309.12, paid on debts of 1881, and \$2,045.19, income delayed on account of change in securities, we should show a balance of \$4,098.07, as the real con-

dition of the college, January, 1883, as compared with January, 1882. It is estimated that the bills due the college will pay its present outstanding debts.

WANTS OF THE COLLEGE.

While we have set forth the capabilities of the college, we have not lost sight of what it urgently needs to increase its efficiency. Its library is not adequate for our purpose,—for the wants of the students. We have no proper library-room. There is no proper place for the cabinet, which is a valuable one for the purposes of instruction. It is the “State Collection,” enlarged and enriched by private donations. During the past year it has received valuable additions of several thousand specimens of minerals, fossils, shells, insects and bird’s eggs and nests, the entire private collection of Mr. Winfred A. Stearns, who presented it to the college, and personally superintended its classification and arrangement. Both this and the library are in dormitory buildings, with all their inconvenience for such purposes, and exposure to fire. We have no room suitable for public college exercises. The hall we now use for chapel is too small for any commencement exercise, and this room is needed to enlarge the chemical department.

One of our pressing needs, therefore, is a public building containing hall for public exercises, for the library and cabinet. We trust some public-spirited man will soon give funds for such a building. The names of the Hills, of Knowlton, and Durfee remind us of what has already been generously given to the college for specific purposes, and we feel that when the work and needs of the college are known, other names will be added to the list of our benefactors.

Our second need, perhaps first in importance, is a fund for payment of instructors. We should have more men, and they should be better paid. We must have men, the equals at least of those in other colleges, and they have more work to do than is ordinarily required of professors in classical colleges.

It was found to be impracticable to erect such a building as the college should have for the military department, for \$5,000. The plans were cut down, but still no bid warranted

the trustees in making a contract. They concluded to build by the day. The work has progressed far enough to show that a large saving has been made over the lowest contract price. Still, the grant will not complete the building. It will be covered so that it can be used for drilling, but it will require from \$1,000 to \$1,500, to complete it for its whole work as drill-hall, armory, gymnasium and lecture room combined. The grant for repairs has been exhausted, and \$1,500 is needed to complete those repairs, and put the old drill-hall in proper condition for a museum of agriculture.

It is hoped that the Cowles buildings may be found adapted to the wants of the experiment station, in which case those buildings will be repaired from the experiment station fund.

NOTE.—The present condition of the several departments is set forth in the special reports hereto annexed, and the plan and work of the college, as an educational institution, are given in the second part of this report, in the curriculum of studies and the schedules of work in the several full departments of instruction.

REPORT OF D. H. TILLSON,

FARM SUPERINTENDENT.

The farm has suffered by the very severe and long-continued drouth, which made crops lighter than they would have been, and almost entirely destroyed the second crop of grass.

The whole area in tillage was 63 acres. Seventeen acres planted to corn yielded 1,500 bushels of ears, and 30 tons of fodder. A part of this corn was the Longfellow variety, raised for seed corn, and was planted in such position on the farm as to keep it free from mixture with the Sturtevant variety, which constituted the bulk of the crop. Both of these varieties give good satisfaction. Four acres to potatoes gave 500 bushels; $1\frac{7}{8}$ acres fodder-corn, 6 tons; 1 acre turnips, 400 bushels; $1\frac{1}{8}$ acres wheat, 41 bushels; 8 acres oats, 350 bushels; 12 acres rye, 180 bushels; wheat and rye straw, 16 tons; 1 acre in garden; 60 acres in grass yielded 90 tons.

The diminished amount of hay cut the present year is accounted for by the loss of the second crop through drouth, by the setting off from the farm of 12 acres highly manured land to the horticultural department, and by keeping as pasture 12 acres more, that, for two years, had been highly manured for grass. Seventeen acres were seeded to rye for feed, and to rye and grass.

Fall seeding. Fourteen acres to rye and grass for feed in pasture; 20 acres to rye; 5 acres to winter wheat; 25 acres to grass; 30 acres were ploughed in the fall, to be cropped next year. The swamp in front of the Cowles house has been drained; loam in brook has been carted on to the clayey knolls in front of the laboratory; 100 loads of loam have been carted into the barn cellar, bushes cut on 4 acres of pasture, and roads on college farm and grounds kept in good repair. This, from the extent of the grounds

and the nature of the roads, is an important item in our labor account.

The teams have done extra work in grading drill-hall, drawing lumber, stone, coal, etc., to an amount of \$411.34.

The neat stock consists of 42 head: 16 cows, 3 oxen, 6 three-year-old steers, 18 head of young cattle, and 1 bull,—all Ayrshire stock.

There are 25 pure blood Berkshire swine, and two small Yorkshires, the latter the gift to the college from Samuel Goodwin of Miller's Falls.

A portion of the college farm is to be set off for the use of the experiment station. This will, for the coming year, further diminish the grass land belonging to the college farm proper. But the remote parts of the farm can be cultivated only at large expense, and the directions for the coming year are to cultivate less ground, and that near the farm buildings. It is difficult to secure help that will be profitable except under immediate supervision of the superintendent, and the labor from students is more for instruction and practice than for profit as labor on the farm. But the experiment station will relieve the farm from all special expense in experimenting, and leave it to do simple farm-work, as a means of giving the students an opportunity to have practical experience in raising crops and managing stock.

NOTE.—As Dr. Miles entered upon his duties January 1, 1883, no report from his department is included in the present trustees' report. For an outline of the course of instruction, proposed by Dr. Miles, reference is made to the schedules of work in the various departments of the college, as given in the second part of this report.

BOTANIC DEPARTMENT.

I have the honor to report the following upon the condition of the botanic department.

The year past has been, as a whole, a prosperous one, although nearly all of the field crops have been injured more or less by drouth. The crops, although not large, have been sold at good prices, which, in a measure, will compensate for the falling off in quantity.

The expenses of the department, as will be seen by the treasurer's report, have exceeded our income; but if the cost of improvements made, and the increased value of the stock and tools be added to the income, the balance will be found on the other side.

The nursery stock in general has been kept fully up to that of 1881, with an increase of 25,000 peach trees budded last fall, and 3,000 budded in 1881, the value of which will exceed \$650, and an increase in the value of teams and tools of more than \$150.

The Durfee plant-house and the propagating house have been put in thorough repair, but an annual expenditure of from \$100 to \$200 must be made to keep them in their present condition. The stock of plants has been very much improved, but if it is desirable to keep them in a "show" condition, much more help must be employed in taking care of them. It is hoped that we shall soon be able to have all the plants in the houses, and the trees and shrubs on the grounds, neatly labelled for the instruction of students and visitors.

The undertaking of new work, and the employment of a man to take charge of the details of the market gardening and seed-growing business, has necessitated the expenditure

of quite a large sum for fertilizers, teams and implements, and fitting the land for future work. Owing to the drouth, the income from this work has been very small compared with the expenses.

We labor under a great disadvantage in carrying on business of any kind here, that our time is often taken up by other matters than of a purely business nature. The longer I am engaged in this work the more fully I am convinced that those departments devoted to business should be given up largely to the superintendence of persons who can devote their entire attention to the work; general superintendence only being needed to keep the work in harmony with the theory of instruction in each department. The special branches of business engaged in, as seed-growing, nursery, plant and fruit-growing, require an unusual amount of intelligence and skill to compete successfully with those already in the field.

Much of the land of the botanic department is unsuited, from its location, for profitable cultivation, and I would again offer the suggestion made in my last report that such land, when properly fitted, be planted with fruit-trees, which in a few years will give more income than could be obtained from it in any other way. The cost of planting would be but trifling, and the trees are already grown in the nurseries on the grounds.

It is difficult to determine how much effort should be directed to the purely ornamental in the care of the greenhouses and grounds; and in passing judgment upon their condition, it must be remembered that the extent of land laid out in walks and roads, and occupied by buildings, the surroundings of which must be more or less ornamented, is exceeded by the public parks of few of the cities of this Commonwealth, and that to keep them in a thoroughly neat and pleasing condition, would require the expenditure of several thousands of dollars.

There are within the limits of the college grounds not far from two and one-half miles of regularly laid out and gravelled roads, the surface of which must be kept in good condition for a large amount of travel, and their borders so as to present a neat appearance at all times during the year.

There are also not far from one and one-half miles of walks, which must be kept in passable condition during the winter, the borders kept trimmed, and the surface smooth and free from weeds during the summer.

More than one thousand ornamental trees and shrubs have been planted on the grounds, requiring a great amount of care to keep them in a good growing condition. In addition to the above, all employees are liable to be interrupted at any time by visitors to whom some courtesy must be shown.

It is hoped that some of the work of this department, which in years past has been experimental, will be assumed by the experiment station, thus relieving us of some expense and enabling us to do better the work we undertake.

The following is a statement of the income of the botanic department for 1882 :—

Total cash received from sales of plants, vegetables, fruits, flowers, etc.,	\$2,830 28
Total cash received from sales of trees, shrubs, vines, etc., .	1,419 78
 	<hr/>
Total cash income,	\$4,250 06
 	<hr/>
Outstanding bills of nursery,	\$52 09
Outstanding bills of plant-house,	308 21
	<hr/>
360 30	
Produce on hand to sell :—	
Cabbages,	\$75 00
Carrots,	20 00
Seed, carrots and cabbages,	25 00
	<hr/>
	120 00
Increase in nursery stock :—	
25,000 budded peach-trees,	\$500 00
3,000 budded peach-trees,	150 00
Increase in value of teams, tools, etc.	150 00
	<hr/>
	800 00
 	<hr/>
Total income,	\$5,530 36

From the expenses of the department, as shown by the treasurer's report, should be deducted the following items :—

Expense of grading, filling, seeding and planting the gravel-pit lot,	\$325 00
Same on Bangs lot,	75 00
Care of walks and roads,	50 00
Plants for decorating grounds of farm-house, dormito- ries, boarding-house, etc.,	22 00

Trees and shrubs for grounds,	\$35 00
Keeping horse and carriage used in part by president, carrying college mail, and care of botanic museum,	50 00
<hr/>	
	\$557 00

The details of the work of the department have been carried out by Mr. L. R. Taft, in the care of the plant-houses, grounds, and sales of produce, etc.; and by Mr. David Wentzell, in the growth and care of the vegetables and other out-door crops. Both have been very faithful in the discharge of their various duties.

The students employed have generally been faithful in doing the work given them, and many of them have shown special skill in various brauches of the work.

The changes in the course of study made during the past year are such as to make the instruction in botany and horticulture much more satisfactory than ever before.

In every particular I am glad to report that this department was never in better condition for future work than at present.

Very respectfully submitted,

S. T. MAYNARD.

MATHEMATICS AND PHYSICS.

The present report embodies no novel features of work in the mathematical department. Its scheme of studies is affected but slightly by the modifications of the curriculum. The allowance of time for mechanics, physics, levelling, and roads and railroads has been diminished, but the work of this department still bears much the same relation to the entire course of study as in previous years.

The mathematics comprise the chief disciplinary studies of the course; therefore my first aim is to develop in the students the mental habit of exactness, not only indispensable for mastery of the pure mathematics, but the first requisite for successful pursuit of all branches of natural science. My second aim is to introduce such exercises as will stimulate ingenuity and originality. My third aim is to give a practical bearing to all studies, by means of experiment and illustration drawn from familiar fields of observation.

During the past term, instruction has been given in algebra, geometry, mechanics and astronomy. The freshmen have made five recitations weekly in algebra. The time allotted would be sufficient for proper treatment of this subject, if the students were at the outset well grounded upon the rudiments of the science. In the present instance the subject will be continued for one month. The sophomores have devoted four hours weekly to the geometry of planes and solids, and the parabola. It is desirable that in future the entire geometry of conic sections be included in the course. Wentworth's Geometry has been introduced for the use of the freshmen who begin this study in the second term. I agree with my predecessor upon the desirability of requiring of candidates for admission some preparatory work in

geometry. A newly revised edition of Peck's Ganot's Popular Physics, is used as text-book of mechanics and physics. Recitations upon the text are supplemented with frequent use of illustrative apparatus, informal lectures, and citation of illustrations. The students have opportunity to become personally familiar with the use of such apparatus as the college possesses, but the incomplete equipment of the department, lack of time, and the policy of the institution, do not favor extensive individual work in the physical laboratory. Special effort will be made to present clearly the subject of sound, heat and light, in which our apparatus is entirely deficient. The college is without facilities for giving instruction in astronomy; and our course of mathematics does not adequately prepare the average student to pursue a demonstrative treatment of the subject. I am therefore convinced that the attention of the class should be chiefly directed to a descriptive view of the science. Particular emphasis seems due to the apparent and actual planetary movements, and their important practical effects, the measurement of time, and familiarity with prominent constellations and first magnitude stars. To this study are allotted three hours weekly during the first term of senior year. Five hours of recitation weekly are assigned to the sophomores in trigonometry, and its application to surveying, navigation and celestial measurements. In this connection, particular attention will be given to mensuration, with reference to measurement of lumber, masonry and excavations. The work in surveying and levelling occupies five hours weekly in the third term, divided between class-room exercises and actual field practice. It is probable that additional time for field work may be secured. It is hoped that every student will become proficient in the use of the instruments commonly employed in engineering work, and will acquire practical familiarity with various methods of land measurement and division. The work in levelling anticipates the study of roads and railroads, to which is assigned three hours weekly in the third term of junior year. The policy of the college prescribes that special attention be given to the discussion of approved and economical methods of making highways. To such extent as time will allow, field work will be provided

in the experimental location of roads, side ditches, culverts and curves, and in the calculation of earthwork from notes of actual railroad surveys. .

I infer from recent observation that the applicants for admission to the college have for the most part no systematic preparatory training. As a consequence they differ widely in attainments, and in capacity for steady application. Some weeks must therefore be spent in bringing the less advanced students into line with their classmates, and in awaking a resolute scholarly spirit among them. Such time is well-nigh lost so far as the curriculum work is concerned. This difficulty may be partially obviated, and better preparation secured, by increasing the requirements for admission, or by setting more rigid entrance examinations than heretofore. In my opinion such an elevation of its scholarship would promote the interests of the college.

The trustees and other friends of the institution will be very welcome at the class exercises of the mathematical department. Such manifestation of interest would gratify and stimulate both students and instructor.

AUSTIN B. BASSETT.

REPORT ON THE MILITARY DEPARTMENT.

HON. PAUL A. CHADBOURNE,

President of the Massachusetts Agricultural College.

SIR:—I have the honor to make the following report of the military department, and to append its theoretical and practical course of instruction.

The fall drills, where seniors for the first time act as instructors, have been more than usually successful. Promptness in efficiently performing their duties has been the rule. This, in a large degree, must be attributed to the few hours that they were assigned to the tactical section room, while juniors. From this, and from the general progress to be seen in the entire corps, which may be reasonably traced to their tactical recitations, and to the added zeal always arising from more complete success,—I am encouraged to urge that juniors be assigned to the tactical section room for one hour per week, in fall terms of succeeding years. Sixteen hours recitation for an *entire year*, cannot be of injury to them in other departments, and in this will produce the most satisfactory results. It is worthy of note that all the various artillery and infantry drills of the course occupy little more than three hours per week, not varying essentially in time from the calisthenics of the average college. They are of a character to give the most general exercise to the entire body,—are in the main, out of doors, and necessitate the united action of the mind and body. Upon graduation, the average student has received such instruction, that under equal circumstances, he would immediately occupy a responsible position alike beneficial to himself and the general government, should circumstances make his services necessary.

While thus obtaining needed physical exercise, *all* must secure lasting benefit, from the discipline and self-command acquired, the military etiquette, personal neatness enforced by careful inspections at all exercises and the weekly inspection of dormitories,—which will follow them into *any* future position. The immediate advantages resulting from the establishment of a military library, to all seeking the information therein contained, are fully realized. A small permanent fund for its gradual increase is needed. At the least, it is hoped that an increased appropriation may be made this year for this purpose. Powder in its various forms, projectiles, fuzes, etc., with little expense could be obtained from this State, or from the United States. This would serve as the nucleus of a military cabinet, of general interest, and whose lack makes much needed instruction difficult. Some changes will be considered the coming year, looking to a rigid accountability from cadet officers, who may be assigned to the charge of sub-divisions in the college dormitories. Some modified form of the system in vogue at West Point may be successfully introduced. The rifle association has been creditably conducted this year. It is entirely optional, and yet fully one-half the students have taken active part. Such rules have been adopted as make the practice as free from danger as possible. A building, now in an advanced stage of construction, which will add much to the general beauty of the college grounds, replaces the inconvenient and unsafe rooms formerly used for drills in the winter. It contains suitable recitation and gun rooms, and no obstruction to regular exercises will be experienced in the future from inclement weather. The State has been generous in its appropriation, and can expect a fitting return from the students. It is especially gratifying to me to note the general excellence of the prize theses of last year's graduates. The commendation extended to them as a class by the board of award through its president, Major John H. Calef, U. S. A., was flattering in the extreme. I may be permitted to urge that the benefits derivable from such stimulants should not escape the attention of the honorable board of trustees.

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

THEORY.

Fall term, Freshman year. One hour per week for the term. Recitations in infantry tactics (Upton's). School of the Soldier. School of the Company. Skirmish drill.

Fall term, Sophomore year. One hour per week for the term. Recitations in U. S. Artillery tactics. School of the Soldier (dismounted), sabre exercise, manual of the piece and mechanical manœuvres, bayonet exercise (infantry tactics). Ammunition, equipment of carriages. Modified service of 8-inch mortars.

Fall term, Junior year. Recitations in infantry tactics (Upton's). One hour per week for the term. School of the battalion. Ceremonies. Company and field service.

MILITARY SCIENCE.

This instruction is given to seniors, extending through the entire college year, two hours per week.

It will include in the form of lectures and recitations from selected text-books, the following subjects:—Ordnance and Gunnery; constitutional and military law and history; campaigns and battles; systems of warfare, present and past; an elementary course in strategy and engineering. It will be modified by such additions and changes as shall seem desirable. Essays are required from each senior on military subjects, when they have become sufficiently instructed to prepare them advantageously. These papers will be read in the recitation room for general note and criticism, or before the entire college. One set, all upon the same subject, are written for prizes,—the award being made by a board of army officers. The successful competitors read their productions at the graduating exercises. Subject for the class of 1883, Military education as a factor of American government.

The competition of the class of 1882 resulted as follows:—

BOARD OF AWARD.

Major JOHN H. CALEF, Second U. S. Artillery.
Captain JAMES CHESTER, Third U. S. Artillery.
Lieutenant CONSTANTINE CHASE, Third U. S. Artillery.

Subject.

The Military Problem of the United States.

Award.

First prize, \$25. W. E. Stone, Amherst, Mass.
Second prize, \$15. W. A. Morse, Boston, Mass.

Especial Mention.

J. B. Paige, Prescott, Mass. J. D. Howe, North Hadley. J. E. Wilder, Lancaster. A. F. Shiverick, Woods Holl, Mass. D. Goodale, Marlborough, Mass. W. H. Thurston, Upton, Mass.

PRACTICE.

All students unless disqualified physically, are required to attend prescribed military exercises, those who pursue special or partial courses at the college not being exempt so long as they remain at the institution. By the commencement of their second term, students are required to provide themselves with a full uniform, comprising coat, blouse, trowsers, cap, white gloves, etc., all of which costs about \$30. Correctness of deportment and discipline are required of all, the routine of the West Point Academy being followed as closely as circumstances will permit. To insure a proper sanitary condition of the college, the commandant makes careful inspections of all rooms and college buildings each Saturday morning, during which all students in full uniform are required to be in their rooms, for the proper police of which they are held to a strict accountability.

At the beginning of each term, issues of such equipments as they will require are made to all students. They will be charged for all injury, loss, and for any neglect in the care of the same.

For practical instruction, the following public property is in the hands of the college authorities: —

- One platoon of light Napoleons (dismounted).
- One six-pounder with limber and equipments.
- Seventy-five sabres and belts.
- One hundred and fifty breech loading rifles (cadet model).

Several accurate target rifles.

Two 8-inch siege mortars with complete equipments.

For practice firing, the United States furnishes blank-cartridges for all guns, and ball-cartridges for rifle practice, which is encouraged by the department.

Drills, amounting to rather less than four hours per week, are as follows :—

Infantry : schools of the soldier, company, and battalion ; manual of arms, and sword ; bayonet exercise, skirmish drill, target practice ; ceremonies, marches, field service.

Artillery : schools of the soldier, detachment, and battery (dismounted). Mortar drill, sabre exercise, pointing, and field service.

BATTALION ORGANIZATION.

For instruction in infantry tactics and discipline, the cadets are organized into a battalion of two or more companies under the commandant. The officers, commissioned and non-commissioned, are selected from those cadets who are best instructed and most soldier-like in the discharge of their duties. As a rule, the commissioned officers are taken from the seniors, the sergeants from the juniors, and the corporals from the sophomores. All seniors are detailed to act as commissioned officers.

Commissioned Staff.

A. A. HEVIA, *Lieut. and Adjutant.* D. O. NOURSE, *Lieut. and Quarter-master.*

Captains.

1. C. H. PRESTON. 2. E. A. BISHOP. 3. H. J. WHEELER.

Lieutenants.

1. J. B. LINDSEY. 2. S. C. BAGLEY.

Non-commissioned Staff.

C. HERMS, *Sergeant-Major.*

Sergeants.

1. C. W. MINOTT. 2. S. M. HOLMAN. 3. E. A. JONES.

Corporals.

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4. G. H. BARBER. 5. C. P. SPAULDING. 6. C. W. BROWNE.

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1882.

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*Professor of Modern Languages.*CHARLES A. GOESSMANN, PH. D.,
*Professor of Chemistry.*SAMUEL T. MAYNARD, B. S.,
*Professor of Botany and Agriculture.*AUSTIN B. BASSETT, A. B.,
*Professor of Physics and Civil Engineering.*MANLY MILES, M. D.,
*Professor of Agriculture.*SECOND LIEUT. VICTOR H. BRIDGMAN, Second Artillery, U.S.A.,
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*Superintendent of Nurseries and Instructor in Agriculture.*EDWARD HITCHCOCK, JR., M. D.,
*Special Instructor in Elocution.*D. H. TILLSON,
Farm Superintendent.

* Gives Instruction in Mental and Moral Philosophy and Natural History.

Graduates of 1882.*

Allen, Francis Sherwin,	Medfield.
Aplin, George Thomas,	East Putney, Vt.
Beach, Charles Edward (Boston Univ.), .	Hartford, Conn.
Bingham, Eugene Percival (Bost. Univ.),	Fitchburg.
Bishop, William Herbert,	Diamond Hill, R. I.
Brodt, Harry Snowden,	Dansville, N. Y.
Chandler, Everett Sawyer,	Coldwater, Mich.
Cooper, James Willard,	East Bridgewater.
Cutter, John Ashburton (Boston Univ.), .	New York City.
Damon, Samuel Chester (Boston Univ.), .	Lancaster.
Floyd, Charles Walter (Boston Univ.), .	Boston.
Goodale, David (Boston Univ.), . . .	Marlborough.
Hillman, Charles Dexter,	Hardwick.
Howard, Joseph Henry,	Hyannis.
Howe, George Dickinson (Boston Univ.),	North Hadley.
Kingman, Morris Bird,	Amherst.
Kinney, Burton Arial,	Lowell.
May, Frederick Goddard (Boston Univ.),	Boston.
Morse, William Austin (Boston Univ.), .	Boston.
Myrick, Herbert (Boston Univ.), . . .	Concord.
Paige, James Breckenridge,	Prescott.
Perkins, Dana Edson,	Wakefield.
Plumb, Charles Sumner,	Westfield.
Shiverick, Asa Frank (Boston Univ.), .	Woods Holl.
Stone, Winthrop Ellsworth,	Amherst.
Taft, Levi Rawson (Boston Univ.), . .	Mendon.
Taylor, Alfred Howland (Boston Univ.), .	Yarmouth Port.
Thurston, Wilbur Herbert (Boston Univ.),	Upton.
Wilder, John Emery (Boston Univ.), . .	Lancaster.
Williams, James Stoddard (Bost. Univ.),	Glastonbury, Conn.
Windsor, Joseph Libbey,	Grafton.
Total,	31

Senior Class.

Bagley, Sydney Currier,	Boston.
Bishop, Edgar Allen,	Diamond Hill, R. I.
Braune, Domingos Henrique,	Nova Friburgo, Brazil.
Fletcher, Frank Howard,	Townsend.
Hevia, Alfred Armand,	Havana, Cuba.

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the college during any portion of the year 1882.

Holman, Samuel Morey,	Attleborough.
Lindsey, Joseph Bridgeo,	Marblehead.
Minott, Charles Walter,	Westminster.
Nourse, David Oliver,	Bolton.
Preston, Charles Henry,	Danvers.
Wheeler, Homer Jay,	Bolton.
Total,	11

Junior Class.

* Goessmann, Henry Edward Victor,	Amherst.
Herms, Charles,	Louisville, Ky.
Holland, Harry Dickinson,	Amherst.
Jones, Elisha Adams,	Rockville.
Mayo, Walter Parker,	Wellesley.
Redding, Merton Jay,	Amherst.
Smith, Llewellyn,	Amherst.
Total,	7

Sophomore Class.

Allen, Edwin West,	Amherst.
Almeida, Luciano José de,	São Paulo, Brazil.
Barber, George Holcomb,	Glastonbury, Conn.
Brooks, Paul Cuff Phelps,	Boston.
Browne, Charles William,	Salem.
Buffington, Charles Owen,	Ware.
Chadbourne, Albert Hopkins,	Amherst.
Cutter, Charles Sumner,	Arlington.
Day, William Lyman,	Warren.
Dickinson, John Francis,	Amherst.
Flint, Edward Rawson,	Boston.
Goldthwait, Joel Ernest,	Marblehead.
Howell, Hezekiah,	Blooming Grove, N. Y.
Leary, Lewis Calvert,	Brooklyn, N. Y.
March, Wilbur Marriam,	Millbury.
Nash, John Adams,	Amherst.
Nichols, Andrew, Jr.,	Danvers.
Phelps, Charles Shepard,	West Springfield.
Putnam, George Herbert,	Millbury.
Spalding, George Edwin,	Billerica.
Spaulding, Charles Plumb,	Amherst.
Taylor, Isaac Newton, Jr.,	Northampton.

* Died April 27, 1882, of inflammation of brain.

Tekirian Benoni,	Yozgad, Turkey.
Whittemore, Joseph Sidney,	Leicester.
Woodbull, George Gouge,	Monroe, N. Y.
Total,	25

Freshman Class.

Barker, John King,	Three Rivers.
Bement, John Emery,	North Amherst.
Clapp, Charles Wellington,	Montague.
Copeland, Alfred Bigelo,	Springfield.
Doucet, Walter Hobart,	Philadelphia, Penn.
Eaton, William Alfred,	Piermont-on-Hudson, N. Y.
Felt, Charles Frederick Wilson,	Northborough.
Gaskill, Milo Audubon,	Mendon.
Kinney, Arno Lewis,	Lowell.
Leland, William Edwin,	Grafton.
Palmer, Robert Manning,	Brookline.
Stone, George Edward,	Spencer.
Winslow, Edgar Daniel,	Ware.
Total,	13

Select Class.

Almeida, Luis Augusto de,	São Paulo, Brazil.
Cutler, George, Jr.,	Amherst.
Danks, Edward Field,	Chicopee.
Davis, Arthur Emmons,	Amherst.
Day, Robert Cutler,	South Framingham.
Kendall, Charles Irving,	Amherst.
Kenfield, Charles Robert,	Amherst.
Lang, Charles Joseph,	Washington, D. C.
Owen, Henry Willard,	Amherst.
Smith, Walter Storm,	Syracuse, N. Y.
Total,	10

Post-Graduates.

Allen, B.S., Francis Sherwin,	Medfield.
Brewer, B.S., Charles,	Amherst.
Fairfield, B S., Frank Hamilton (Boston Univ.),	Waltham.

Floyd, B.S., Chas. Walter (Boston Univ.), Boston.		
Hills, B.S., Joseph Lawrence (Boston Univ.),	Boston.	
Kinney, B.S., Burton Arial,	Lowell.	
Plumb, B S., Charles Sumner,	Westfield.	
Smith, B.S., Hiram Fred Markley,	North Hadley.	
Stockbridge, B.S., Horace Edward (Boston Univ.),	Amherst.	
Taft, B.S., Levi Rawson (Boston Univ.), Mendon.		
Washburn, B.S., John Hosea (Boston Univ.),	Bridgewater.	
Total,		11

Specials in Chemistry.

Cardoso, Peleusia,	Rio Janeiro, Brazil.
Jaqueth, Isaac Samuel,	Liverpool, N. Y.
Total,	2

Summary.

Specials in Chemistry,	2
Post-Graduates,	11
Graduates of 1882,	31
Senior Class,	11
Junior Class,	7
Sophomore Class,	25
Freshman Class,	13
Select Class,	10
Total,	110

COURSE OF STUDY AND TRAINING.

FRESHMAN YEAR.

First Term. — Structural Botany ; Lectures on Agriculture ; Algebra ; Declamations ; Military Tactics ; Lectures on health and habits of study, and general plan of college work ; Military Drill ; Practical work in Agriculture under direction of Professor ; French (optional).

Second Term. — Agriculture ; Systematic Botany ; Freehand Drawing ; Declamations ; Geometry ; Rhetoric and Elements of Composition ; Military Drill ; French (optional).

Third Term. — Agriculture ; Geometry ; Systematic Botany ; History ; Declamations ; Compositions ; Military Drill ; Labor, under direction of Professors of Agriculture and Horticulture ; French (optional).

SOPHOMORE YEAR.

First Term. — Botany, with special reference to forage, field and garden crops ; Chemistry ; Agriculture ; History ; Compositions ; Declamations ; Military Tactics ; Geometry and Trigonometry ; Military Drill ; Labor ; German (optional).

Second Term. — Agriculture ; Practical Study in Plant-house ; Chemistry ; Zoölogy ; Declamations ; Trigonometry and its applications ; Military Drill ; German (optional).

Third Term. — Human Anatomy and special subjects in Zoölogy ; Practical Surveying, with use of instruments in the field ; History ; Compositions ; Declamations ; Military Drill ; Labor ; German (optional).

JUNIOR CLASS.

First Term. — Agriculture ; Horticulture and Market Gardening ; Entomology, — useful and injurious insects, — care of bees, etc. ; Mechanics ; English Literature ; Military Tactics ; Compositions ; Declamations ; Military Drill ; Labor.

Second Term. — Practical Chemistry ; Arboriculture and care of Nurseries ; Physics ; Mechanical Drawing ; Original Declamations ; Agricultural Debate ; Military Drill.

Third Term. — Practical Chemistry ; English Literature ; Modern History and Constitution of the United States ; Original Declamations ; Road-making and Railroads ; Military Drill ; Labor.

SENIOR YEAR.

First Term. Stock and Dairy Farming ; Practical Chemistry ; Original Declamations ; Book-keeping and business forms ; Astronomy ; Military Science ; Mental Science ; Military Drill.

Second Term. — Agriculture ; Geology and Mineralogy, with special reference to Agriculture ; Original Declamations ; Formation of English Language, its history and elements ; Lectures on Veterinary ; Organic Chemistry ; Microscopy ; Military Science ; Military Drill.

Third Term. — Forestry and Landscape Gardening ; Agricultural Reviews ; Military Science ; Moral Science ; Formation of English Language, its history and elements ; Elocution ; Military Drill.

NOTE.—For a fuller account of the work done, reference is made to the following outlines and explanations of the work in each of the leading departments of the college.

INSTRUCTION NOW GIVEN BY THE PRESIDENT.*

FRESHMAN CLASS.

Lectures on health and habits of study ; the best use of time in college ; explanation of the plan and work of the college ; outline of the work in each department.

SOPHOMORE CLASS.

General Zoölogy, with text-book and lectures :

Special studies in Zoölogy : Domestic animals ; Insects injurious and beneficial ; care of bees, etc.

SENIOR CLASS.

Geology, with text-book and lectures : Structure of the earth's crust ; Geological agencies now in operation ; formation of soils, marsh-beds, peat-beds, etc.

Outline Study of Man: His physical organization ; outlines of mental and moral philosophy ; principles of logic.

For the study of all these subjects needing illustration, the college furnishes ample facilities in its cabinets, collection of plates, manikins, skeletons.

* The subjects taught by special instructors and lecturers are not given in the following list of departments.

PRACTICAL AGRICULTURE.

COURSE OF INSTRUCTION.

DEPARTMENT OF PRACTICAL AGRICULTURE.

FRESHMAN YEAR.

First Term.

The Farm.—Arrangement of fields; farm roads; economy of labor.

Physical Improvement of Soils.—Tillage operations; general principles; the plough; its history and development; ploughs and ploughing; parts of the plough and their functions; line of draught and adjustments for special work; form of furrow for different purposes; other implements for preparing the soil.

Harvesting of Crops.—Harvesting machinery; care and management; curing and storing of crops.

Second Term.

Drainage.—General principles; different kinds of drains; forms of tiles; laying out and construction of drains; improved methods of laying tiles; removing obstructions and care of drains.

Irrigation.

Farm Fences.—Construction and repairs.

Farm Buildings.—Adaptation to purpose; location and size; sanitary considerations; plans and construction with reference to storage of crops; accommodation of animals and economy of labor in the system of management.

Third Term.

History of Domestic Animals.—Characteristics of different breeds of horses, cattle, sheep, swine and poultry. Stereopticon views of photo-portraits of typical forms of the leading breeds are used for illustration.

SOPHOMORE YEAR.

First Term.

Stock Breeding.—Form of animals as an index of qualities.

Animal Motors.—Principles of draught; conservation of energy.

Second Term.

Ancient Agriculture. — With reference to the development of systems and rules of practice.

Pioneer Farming. — Its methods and results.

System in Farming. — Mixed husbandry ; general principles and their special applications.

Soils. — Classification and characteristics ; fertility and condition ; theories of exhaustion ; adaptation of crops to soil ; special management ; nitrification ; practical considerations.

JUNIOR YEAR.*First Term.*

Manures. — Economy of ; care and application ; barnyard manure ; specific influences and methods of valuing ; commercial manures.

Rotation of Crops. — General principles ; relations to climate and to the supply of manures and cattle food ; conservation of elements of fertility.

Second Term.

Methods of Agricultural Improvement. — General applications of science ; methods of experimenting ; field experiments ; feeding experiments.

High Farming. — Its methods and results.

SENIOR YEAR.*First Term.*

Special Systems of Farming. — Stock and dairy farming ; feeding and care of animals ; system of management ; relations of food to the resulting animal product.

Special Crops. — Cereals ; forage crops ; root crops ; methods of cultivation ; pastures and meadows.

Throughout the year the class will be assigned duties in connection with the experiments in progress at the experiment station.

Third Term.

Review and discussion of the relations of the several topics of the course.

BOTANIC DEPARTMENT.**FRESHMAN YEAR.***Botany.*

First Term. — 4 hours per week. Structural botany.

Second Term. — 2 hours per week. Structural and systematic botany.

Third Term. — 3 hours per week. Systematic botany.

Drawing.

Third Term. — 3 hours per week. Freehand drawing.

SOPHOMORE YEAR.*Botany.*

First Term. — 3 hours per week. Systematic botany and special study of useful plants.

Second Term. — 1 hour per week. Special study of ornamental and green-house plants.

JUNIOR YEAR.*Horticulture.*

First Term. — 3 hours per week. Care and cultivation of orchards and small fruits; propagation and care of green-house and bedding plants; propagation and growth of vegetables under glass and in the field; care of hot-beds, cold-frames, green-houses, graperies, etc.

Arboriculture.

Second Term. — 3 hours per week. Propagation and care of ornamental trees and shrubs.

Mechanical Drawing.

Second Term. — 3 hours per week. Use of instruments; making of farm buildings, with specifications, etc.

Manual Labor.

First and Third Terms. — 3 hours per week. Instruction in the details of all horticultural and green-house work.

SENIOR YEAR.*Microscopy.*

Second Term. — 4 hours per week. Study and use of the microscope, with special study of plant-tissue.

Landscape Gardening.

Third Term. — Study of plans and planting of ornamental grounds; study of trees, shrubs and plants used in ornamental planting.

Forestry.

Third Term. — Planting, care and preservation of forests; influence upon climate; planting for special protection.

COURSE OF INSTRUCTION IN CHEMISTRY.

SOPHOMORE YEAR.

First Term. — Elementary chemistry, — metalloids; lectures with recitations, 4 hours each week.

Second Term. — Elementary chemistry, — metals; lectures with recitations, 4 hours.

JUNIOR YEAR.

Second Term. — Laboratory exercises in analytical chemistry, with recitations, 5 hours, — metallic elements.

Third Term. — Laboratory exercises in analytical chemistry, with lectures and recitations, 9 hours, — mineral acids, mixtures of various descriptions, industrial products, etc.

SENIOR YEAR.

First Term. — Laboratory exercises in analytical chemistry, with lectures and recitations, 7 hours, — analyses of minerals, soils and fertilizers.

Second Term. — Organic chemistry, with reference to agriculture and agricultural chemical industry; lectures with recitations, 4 hours.

The chemical laboratory is open for the accommodation of post-graduates and special students in chemistry every day in the week, except on Saturday, from 8.30 A. M. to 12.30 P. M. The afternoons are reserved for quantitative analytical work connected with scientific investigations.

SYNOPSIS OF WORK IN MATHEMATICS
AND PHYSICS.

FRESHMAN YEAR.

Algebra.

First Term. — 5 hours.

Geometry.

Second Term. — 5 hours. Wentworth, Books I. and II.

Third Term. — 4 hours. Wentworth, Books III., IV. and V.

SOPHOMORE YEAR.

First Term. — 4 hours. Wentworth, Books VI., VII. and VIII.; conic sections.

Trigonometry.

Second Term. — 5 hours. With application to surveying, navigation and mensuration.

Surveying and Levelling.

Third Term. — 5 hours. Chaining ; surveying by chain, compass and theodolite ; plotting ; computing area ; laying out land ; dividing land ; section levelling ; cross-section work ; topographical maps.

JUNIOR YEAR.*Mechanics.*

First Term. — 4 hours. Also sound and heat.

Physics.

Second Term. — 4 hours. Optics, magnetism and electricity.

Roads and Railroads.

Third Term. — 3 hours. Theory of common roads ; experimental location of roads, ditches, culverts and curves ; calculation of earthwork.

SENIOR YEAR.*Astronomy.*

First Term. — 3 hours.

Book-keeping and Business Forms.

First Term. —

REPORT OF THE DEPARTMENT
OF
ENGLISH AND THE MODERN LANGUAGES.

BY PROF. H. H. GOODELL.

REPORT.

PRESIDENT PAUL A. CHADBOURNE:

Sir, — I have the honor to submit the following tabularized statement of the department of which I have charge: —

English Studies.

RHETORIC. HISTORY. ENGLISH LITERATURE.

FRESHMAN	{ 2d Term — 4 hours. Rhetoric and Elements of Composition. 3d Term — 4 hours. History, European.
SOPHOMORE	{ 1st Term — 1 hour. History, English. 3d Term — 4 hours. History, American.
JUNIOR	{ 1st Term — 4 hours. } English Literature. 3d Term — 4 hours.
SENIOR	{ 2d Term — 1 hour. } Formation of the English Language, treated historically. 3d Term — 1 hour.

Composition.

FRESHMAN	{ 2d Term — 1 hour. } Descriptive. 3d Term — 1 hour.
SOPHOMORE	{ 1st Term — 1 hour. Biographical. 3d Term — 1 hour. Historical.
JUNIOR	{ 1st Term — 1 hour. Imaginative & Argumentative. 2d Term — 1 hour. } Original Declamations. 3d Term — 1 hour.
SENIOR	{ 1st Term — 1 hour. } 2d Term — 1 hour. } Original Declamations. 3d Term — 1 hour.

Drill in Elocution.

One hour per week for each class.

Modern Languages. (Optional.)

FRENCH.

FRESHMAN	{ 1st Term — 4 hours. Grammar and Reader. 2d Term — 4 hours. Translation Fiction or History. 3d Term — 4 hours. Translation Scientific Works.
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GERMAN.

SOPHOMORE { 1st Term — 4 hours. Grammar and Reader.
 { 2d Term — 4 hours. Fiction or History.
 { 3d Term — 4 hours. Scientific Works.

The aim has been to make the course progressive and thoroughly practical. Commencing in freshman year with the study of rhetoric and the principles of composition, the student is led by easy and successive steps, from exercises in simple, descriptive narration, up to the higher forms of essay and original declamation. The instruction in history during freshman and sophomore years is given partly by text-book and partly by lecture. Of the three terms set apart for this work, the first is devoted to a discussion of the prominent points of European history; the second to English history, with special reference to its bearing upon that of our own country; and the third to American history,—the whole being introductory to a study of the Constitution of the United States as provided for in the third term of junior year.

The course in modern languages has, during the past year, been made optional. The method of instruction pursued has been the same in both languages, the object being to secure fluency and ease in translation, rather than to make finished scholars. To this end, the first term has been devoted to mastering the general principles of grammar, the rules for pronunciation, and to the reading of some light, easy work. In the second term, more advanced translation has been attempted, usually from some standard author in fiction or history; while in the third, the selection has been made of a scientific work, which should not only afford practice in translation, but furnish information in some one of the various departments of agriculture. In this way have been read Puys—Plants under Glass; Vaulx—What Constitutes a Dairy; Schleiden—Plant-Life; Prosch—Breeding and Care of Cattle.

DAILY ROUTINE, FIRST TERM, 1882-83.

GENERAL EXERCISES.

At 7.15 A. M.,	Breakfast.
8.15 "	Chapel.
8.30 "	Inspection rooms, Saturdays.
10.30 "	Church, Sundays.
12.30 P. M.,	Dinner.
2.00 "	Declamation, Wednesdays.
6.00 "	Supper.

Exercises of Senior Class.

At 8.30 A. M., .	Chemistry, Mondays, Tuesdays, Wednesdays.
8.30 " "	Stock and Dairy Farming, Thurs., Fridays.
9.30 " "	Chemistry, Mondays, Tuesdays, Wednesdays.
9.30 " "	Mental Science, Thursdays, Fridays.
10.30 " "	Stock and Dairy Farming, Mondays.
10.30 " "	Bookkeeping, Tuesdays.
10.30 " "	Military Science, Wednesdays, Thursdays.
10.30 " "	Chemistry, Fridays.
11.30 " "	Astronomy, Mon., Tues., Wed., Thurs.
11.30 " "	Bookkeeping, Fridays.

Rehearsals as directed. Military drill as ordered.

Exercises of Junior Class.

At 8.30 A. M., .	Agriculture, Mondays, Tuesdays.
9.30 " "	English.
10.30 " "	Mechanics, Mon., Tues., Wed., Thurs.
10.30 " "	Rehearsals, Fridays.
11.30 " "	Horticulture, Mondays, Tuesdays.
11.30 " "	Entomology, Wed., Thursdays, Fridays.
1.30 P. M., .	Class Work as directed.

Military Drill as ordered.

Exercises of Sophomore Class.

At 8.30 A. M., .	English, Mondays.
8.30 " "	French, Tues., Wed., Thurs., Fri.
9.30 " "	Geometry, Mon., Tues., Wed., Fri.
9.30 " "	Military Tactics, Thursdays.
10.30 " "	Botany, Mondays, Tuesdays, Wednesdays.
10.30 " "	Agriculture, Thursdays, Fridays.
11.30 " "	Chemistry, Mon., Tues., Wed., Thurs.
11.30 " "	English, Fridays.

Rehearsals as directed.

1.30 P. M., .	Class Work as directed.
	Military Drill as ordered.

Exercises of Freshman Class.

At 8.30 A. M., .	Algebra.
9.30 " "	Botany.
10.30 " "	Lectures on Health, Mondays.
10.30 " "	Agriculture, Tuesdays, Wednesdays.
10.30 " "	Rehearsals, Fridays.
11.30 " "	Military Tactics, Thursdays.
1.30 P. M., .	Class Work as directed.

Military Drill as ordered.

CALENDAR FOR 1883.

The third term of the collegiate year begins April 5, and continues till June 20.

The first term begins Sept. 13, and continues till Dec. 18.

The second term begins Jan. 10, and continues till April 4, 1884.

There will be an examination of candidates for admission to the college, at the Botanic Museum, at 9 A. M., Tuesday, June 19, and also on Thursday, Sept. 13.

The Farnsworth Prize Declamations take place Monday evening, June 18.

The public examination of the graduating class for the Grinnell Prize for excellence in Agriculture, will take place on Tuesday forenoon, June 19.

The exercises of Graduation Day occur June 20.

ADMISSION.

Candidates for admission to the Freshman Class are examined, orally and in writing, upon the following subjects: English Grammar, Geography, Arithmetic, Algebra through simple equations, and the History of the United States.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the college until he is fifteen years of age; and every student is required to furnish a certificate of good character from his late pastor or teacher. Tuition and room-rent must be paid in advance at the beginning of each term, and bills for board, fuel, etc., at the end of every term.

The regular examinations for admission are held at the Botanic Museum, at 9 o'clock, A.M., Tuesday, June 19, and on Thursday, Sept. 13; but candidates may be examined and admitted at any other time in the year.

Certificates. — Students who have completed the whole work of preparation may be admitted on diplomas of high schools. All students are admitted on probation only, and if not able to go on with their classes in a satisfactory manner, they will be notified to leave.

EXPENSES.

Tuition,	\$12 00 per term.
Room-rent,	\$5 00 to 10 00 per term.
Board,	2 50 to 3 50 per week.
Expenses of chemical laboratory to students of practical chemistry,	10 00 per term.
Public and private damages, including value of chemical apparatus destroyed or in- jured,	At cost.
Annual expenses, including books,	\$250 00 to \$350 00

REMARKS.

The regular course of study occupies four years; and those who complete it receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the college may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the college, thereby becoming entitled to all the privileges of its alumni.

The instruction in the languages is intended to qualify the graduates to write and speak English with correctness and effect, and to translate French with facility. The scientific course is as thorough and practical as possible, and every science is taught with constant reference to its application to agriculture and the wants of the farmer.

The instruction in agriculture and horticulture includes every branch of farming and gardening which is practised in Massachusetts, and is both theoretical and practical. Each topic is discussed thoroughly in the lecture-room, and again in the plant-house or field, where every student is obliged to labor under the direction of the professor when suitable work can be done on the farm, gardens or nurseries. The amount of required work, however, is limited to six hours per week, in order that it may not interfere with study. Students are allowed to do additional work for wages, provided they maintain the necessary rank as scholars.

Indigent students are allowed to do such work as may offer about the college or farm buildings, or in the field; but it is hardly possible for one to earn more than from fifty to one hundred dollars per annum, besides performing other duties. So far as it

consistent with circumstances, students will be permitted to select such varieties of labor as they may, for special reasons, desire to engage in.

Those who pursue a select course attend recitations and lectures with the regular classes; but those properly qualified, who desire special instruction in botany, chemistry, civil engineering, veterinary science, agriculture, or horticulture, may make private arrangements with the officers having charge of these departments.

EXTRA EXPENSES.

An expenditure of from ten to fifty dollars is necessary to provide furniture, which may be purchased at reasonable rates, either new or second hand. At the beginning of the second term of attendance each student is required to provide himself with the full uniform prescribed for the battalion of Agricultural Cadets, the cost of which is about thirty dollars. Students tax themselves for the support of a reading-room and literary societies.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given: In the south dormitory the main corner-rooms are fifteen by eighteen feet, and the adjoining bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner-rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

SCHOLARSHIPS.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

The trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs.

The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter college with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture. To every such student the cash value of a scholarship is one hundred and forty-four dollars.

RELIGIOUS SERVICES.

Prayers in chapel every morning at a quarter before eight o'clock. On Sundays the students, unless excused by request of their parents to attend church elsewhere, attend service in the chapel. This service is conducted by the president or such clergyman as he invites. The students are also invited to join a class for the study of the Bible.

The Young Men's Christian Association holds weekly meetings.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the College or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the Faculty in their respective departments.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The library of the college contains about two thousand volumes. Among them are several sets of cyclopædias, magazines, and newspapers, reports of agricultural societies, and State boards of agriculture, and many standard works on agriculture and horticulture. There are also many useful works of reference in chemistry, botany, surveying, and drawing.

The Faculty and students also have the privilege of drawing books from the excellent library of Amherst College, which contains over thirty thousand volumes.

The State cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the college, and is of much value for purposes of instruction.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods, and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About fifteen hundred species and varieties of plants are cultivated in the Durfee Plant-House, affording much pleasure and information to students and visitors.

The class in microscopy has the use of seven of Tolles's best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

PRIZES.

FARNSWORTH RHETORICAL MEDALS.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, which is to be used for the purchase of gold and silver medals, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Claffin of Boston has given the sum of one thousand dollars for the endowment of a first prize of fifty dollars, and a second prize of thirty dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILL'S BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1883, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

REGULATIONS.

I.—Students are forbidden to combine for the purpose of absenting themselves from any required exercise, or violating any known regulation of the college.

II.—The roll shall be called five minutes after the ringing of the bell for each exercise of the college, by the officer in charge,

unless a monitor be employed ; and students who do not answer to their names will be marked absent, provided that any student coming in after his name has been called shall be marked tardy. Two tardinesses shall be reckoned as one absence.

III.—Absence from a single exercise may be allowed or excused by the officer in charge of the same, if requested beforehand ; but permission to be absent from several exercises must be obtained in advance from the general excusing officer, or from the president. In such cases the officer excusing will furnish a certificate of excuse, which shall state the precise time for which absence is permitted, and which shall be a satisfactory reason for absence from all exercises occurring within the time specified.

IV.—Excuse for absence from a college exercise must be obtained before the same occurs ; and no excuse will be granted afterwards, unless the student shows the cause of the absence to be one of imperative necessity, and which could not be foreseen or prevented.

Permission to be absent from several consecutive exercises must be obtained from the excusing officer or the president ; but excuse for absence from a single exercise *must* be obtained of the officer in charge of the same.

Permission for absence by the excusing officer or president will be given in the form of a certificate, the recipient of which must exhibit the same to each officer from whose exercise it gives leave of absence, as soon as the first exercise of the officer at which he is thereafter present ; and his failure to do so will annul his right to excuse from the exercise of such officer.

A record of all tardiness will be rigidly kept ; and, unless excused by the officer with whom they occur, two such will be entered on the record as an unexcused absence.

Each unexcused absence will be considered disobedience to college rule ; and, if the aggregate number of such absences in all departments reaches *two*, the student so delinquent shall be informed of the fact. If the number of such absences reaches *four*, the parent or guardian of the student shall be informed of his delinquencies ; and, if *five* such delinquencies are justly recorded against any student, his connection with the college may be terminated.

V.—Students are forbidden to absent themselves without excuse from the regular examinations, to give up any study without permission from the president, or to remove from one room to another without authority from the officer in charge of the dormitory buildings ; and no student shall be permitted to make such change until he has procured from the inspecting officer a

written statement that the room about to be vacated is in perfect order.

VI.—Students shall be required to attend the church of their selection regularly on Sunday morning, and report in writing to the excusing officer, during the ensuing week, whether they attended or not.

VII.—The record of deportment, scholarship and attendance will be carefully kept; and, whenever the average rank of a student falls below fifty, he will not be allowed to remain a member of the college, except by a special vote of the Faculty. Admission to the college, and promotion from class to class, as well as to graduation, are granted only by vote of the Faculty.

VIII.—Students are required to abstain from any thing injurious to the buildings and other property of the college, and in all respects to conduct themselves with propriety.

IX.—Parents and guardians are specially urged to co-operate with the Faculty in securing the faithful attendance of students upon every appointed exercise of the college.

X.—Military drill must be continued to graduation; and any student who neglects this exercise any part of graduation week, will not be entitled to a recommendation for a college diploma.

Statement of Cash Receipts and Payments for the Year 1882.

1882.		<i>Receipts.</i>	<i>Payments.</i>
Jan.	Balance on hand,	\$2,264 32	Expenses,—
	Income from endowment fund,*	11,428 97	Farm account,
"	term-bills,	3,849 24	Botanical account,
"	farm produce,	2,786 07	Term-bill account,
"	plant-house and nursery,	3,865 99	Expense account,
"	Mary Robinson Fund,	70 00	Hills Fund,
"	Farnsworth Prize Fund,	75 00	Laboratory account,
"	Grinnell Prize Fund,	80 00	Salaries,
"	Whiting Street Fund,	40 00	Farnsworth Prize Fund,
"	Hills Fund,	592 00	Grinnell Prize Fund,
			Balance,
			\$24,306 83
			744 76
			\$25,051 59
			\$25,051 59

* By change in securities the income received from this fund Jan., 1883, was only \$2,669.50, as against \$4,714.69 in 1882. The large receipts from the State fund are now in April and October.

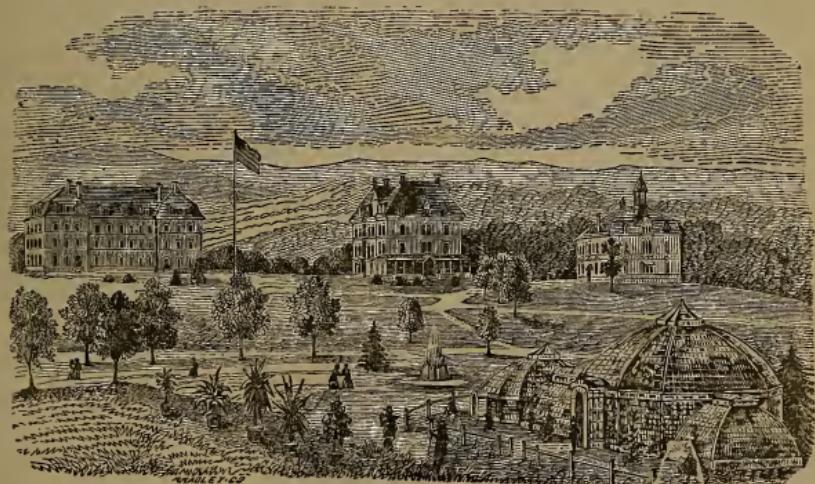
JOHN CUMMINGS, *Treasurer.*

SENATE.

No. 5.

TWENTY-FIRST ANNUAL REPORT
OF THE
MASSACHUSETTS
AGRICULTURAL COLLEGE.

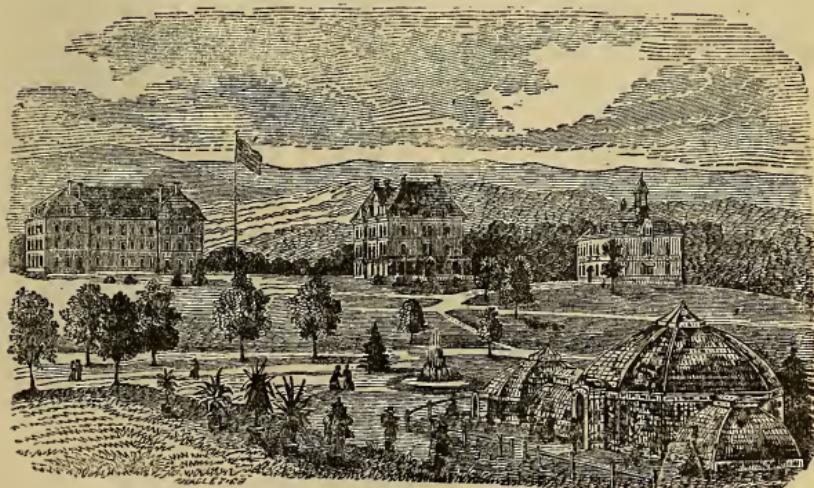
JANUARY, 1884.



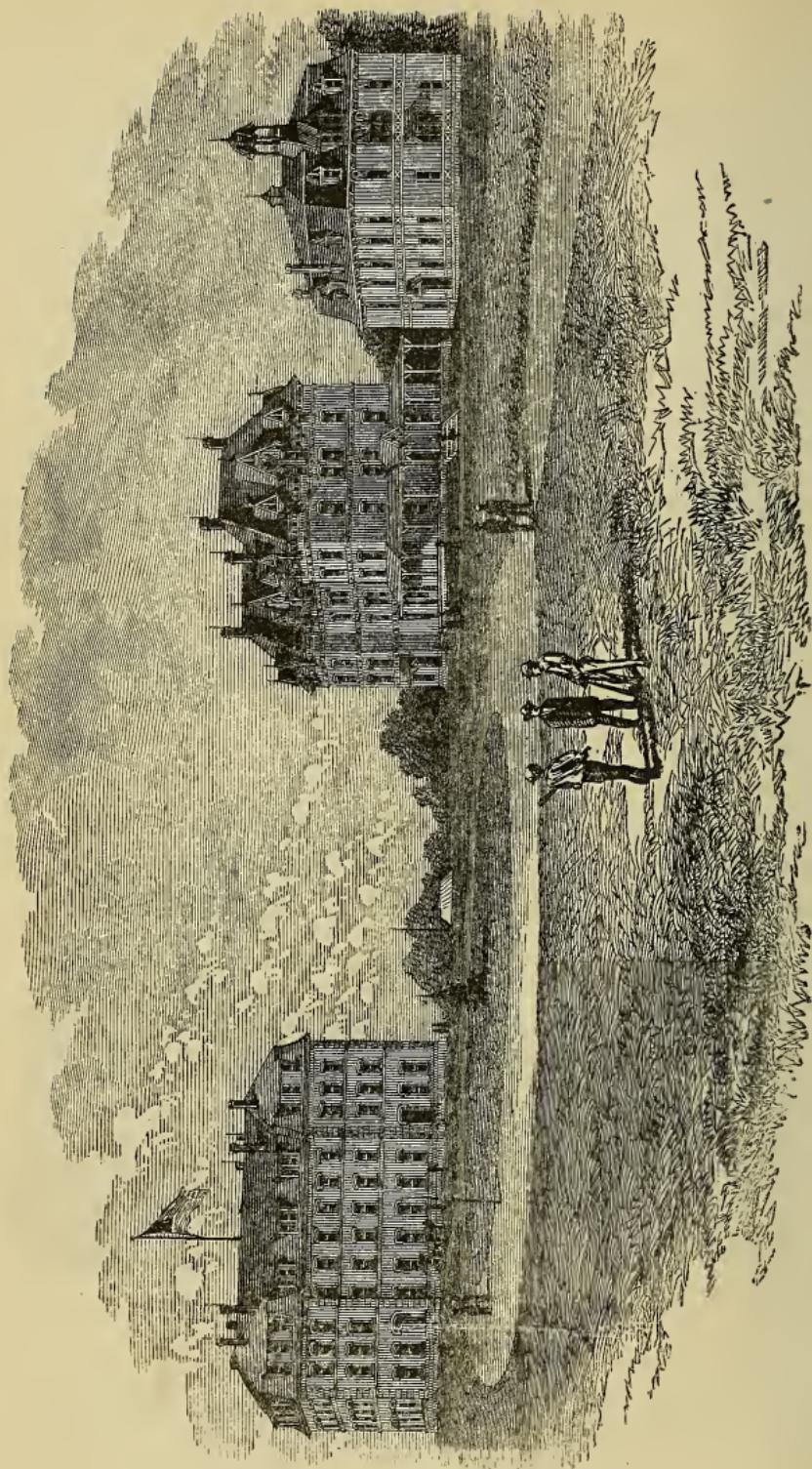
BOSTON :
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1884.

TWENTY-FIRST ANNUAL REPORT
OF THE
MASSACHUSETTS
AGRICULTURAL COLLEGE.

JANUARY, 1884..



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1884.



Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT,
BOSTON, January 11, 1884.

To the Honorable Senate and House of Representatives :

I have the honor herewith to transmit, for the information and use of the General Court, the Twenty-first Annual Report of the Trustees of the Massachusetts Agricultural College.

GEO. D. ROBINSON,
Governor.

Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE

AMHERST, Jan. 10, 1884.

To His Excellency GEO. D. ROBINSON:

SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Twenty-first Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,

Your obedient servant,

JAMES C. GREENOUGH,

President.

CONTENTS.

	PAGE
REPORT OF TRUSTEES:	
Introductory,	9
Course of Study,	12
Gifts to the College,	17
Immediate Needs of the College,	18
Scholarships,	19
Concluding Remarks,	20
Report of Department of Agriculture,	21
Report of Farm Superintendent,	24
Report of Botanic Department,	29
Report of Chemical Department,	35
Experiments at the College since 1870,	37
Report of Mathematical Department,	40
Report of Department of English and Modern Languages,	42
Report of Military Department,	44
Catalogue and Circular,	51

ANNUAL REPORT OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

To His Excellency the Governor and the Honorable Council:

The year that has passed will doubtless prove one of the most important in the history of the college. The energy, the wisdom and the devotion of Dr. Chadbourne, aided by many friends of the college, have begun to yield fruit promising lasting benefit to every section of the State. It is seldom that an institution is subjected to so severe a loss as the college sustained in the death of its president, Paul A. Chadbourne, LL.D., Feb. 23, 1883. Speaking of his acceptance of the office early in 1882, a member of the Board of Trustees says: —

“ After due consideration, he consented to accept the proffered position, and lost no time in entering upon the duties it involved. The State College at that time needed all the energy, oversight, executive ability, ripe experience, innate enthusiasm and educational resources which such a man only could supply. Rarely have a man and his work so happily met. He seemed to comprehend the extent and peculiarity of the field on which he had entered, as it were with a single steady glance; and it at once became obvious that the college was to have the benefit of a masterly mind and character.”

In the obituary sketch which is found in the Alumni Record of 1883 Prof. Bassett thus speaks of him:

“ During the period of his service here, President Chadbourne impressed himself upon faculty and students as a man of power and sincere purpose. All have caught in some measure his earnest,

resolute spirit. He imparted an impetus to the college which has become a vigorous internal life. His plans were large, his execution prompt and effectual. The erection of a commodious drill hall, the improvement of other buildings and their surroundings, and the revision of the curriculum, are evident features of his work. More valuable, even, were his services in securing to the college the interest and confidence of the people. . . . He is mourned by associates in business interests, who found him enterprising and sagacious; by the champions of pure legislation and civil-service reform, who will miss from their councils one whom they knew to be fair-minded in his opinions, unflinching in his convictions, and fearless in assault upon false systems and corrupt institutions; by the people of Massachusetts, who esteemed him a trustworthy citizen, actuated by pure motives for the public weal; by fellow-members of scientific and literary associations, who valued his scholarly labors and respected his high attainments; by the friends of truth and righteousness, nation-wide, who honor him as the foe of evil and the advocate of true religion; by hundreds of men who have caught inspiration from his teachings and wisdom from his counsels; by the trustees, faculty and students of the college to which his last strength was given. Few men have touched human life at so many points or with so firm a hand. Few have exerted influence so permanent; written records so fair; bequeathed memories more fragrant. None have been more loyal to high purposes; none more true to convictions of duty."

We cannot specifically state the good work for the college attempted by Dr. Chadbourne, but we are able to give the general outline of what he proposed, in his own words. Speaking of the act of Congress, in accordance with which our own college and those in other States were founded, he says: —

" Whatever mistakes may have been made in the organization and management of these institutions, no fault can be charged homé to the original bill. It was eminently a wise measure, and suggested an outline of organization and management that has not as yet been improved upon. Its significant words are as follows: 'The endowment, support and maintenance of at least one college where the *leading object* shall be, without excluding scientific and classical studies, and including military tactics, to teach such branches of learning as are *related* to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the *liberal* and *practical* educa-

tion of the industrial classes in the several pursuits and professions of life.' No branch of learning peculiar to the old colleges was to be necessarily excluded; but the new colleges were to push on to the practical application of the sciences they taught, and they were to train all their students as defenders of their country against domestic rebellion or foreign invasion. In a word, they were to educate their students as *men* and as *American citizens*. The rank of the education given is '*liberal*,' the term applied to the education given by the highest institutions then known. It was to be so broad as to fit men for the 'several pursuits and professions of life.' . . . Many who have attempted the management of these colleges, as well as many who have criticised them, have apparently overlooked the broad and generous plan upon which they were founded. It is doubtful if they will ever accomplish the great work for which they were intended, until their original purpose is so fully and constantly recognized and carried out by judicious, painstaking work, that the currents of education shall be once fairly turned toward these new channels. When once fairly turned, that they will continue to flow can no more be doubted than we can doubt the success of any natural process when not artificially obstructed. An education that 'gives boys what they need to daily use when they become men,' commends itself as rational and practical."

The plan as thus in general outlined secured the hearty approval of the trustees, and its execution was well begun when Dr. Chadbourne was suddenly removed by death.

From the time of his death until the beginning of the present college year, the affairs of the college were wisely administered by Prof. H. H. Goodell, as acting president. As he was unwilling to assume the duties of the presidency permanently, the trustees, by a special committee, sought a successor to Dr. Chadbourne. After much inquiry and careful deliberation, it was determined to secure the services of James C. Greenough, a graduate of Williams College, who, by his early training, was skilled in agriculture, and who, owing to his administrative ability, his acquirements, and his success in teaching, had already been urged to accept the presidency of a classical college in another State. Mr. Greenough refused to allow his name to be used as a candidate, but as the trustees, through their committee, persistently urged the need of his services at the college, and

the wide field for usefulness which it presented, he at length severed his connection with the State Normal School in Rhode Island, and entered upon his duties as president in September, 1883.

COURSE OF STUDY.

After a careful study of the condition and prospects of the college, President Greenough determined to specifically work out the plan proposed by Dr. Chadbourne. The studies of the college course are now so arranged as to form two general courses of study. One is termed the Scientific and Agricultural Course, the other is termed the Scientific and Literary Course. The first provides for all the agricultural study which our facilities allow. We are increasing the opportunities for special instruction in agriculture as fast as we can. We believe it will be for the advantage of the State to invest more in the farm as a means of agricultural training. To make the farm the effective basis of a training school, considerable expenditures must be made. To secure desirable practical results, a variety of crops should be cultivated under different conditions, as a means of instruction rather than of profit. In training to any employment so varied and complex as agriculture in its several departments, there must be loss of material.

The Scientific and Literary course of study is adapted to those whose previous practical knowledge of agriculture, or whose choice of other employments than that of tilling the soil, requires that less time shall be spent in field work. The college, as now organized, offers its course of instruction to any young man who is qualified to pursue it. The question may here be asked, "Do not other colleges in the State provide for the instruction of those who are not to be farmers?" The other colleges in the State require for admission to their regular course from two to four years' preparatory study of Latin and Greek. Many students cannot afford to give so much time to the study of these languages before entering college, and wish to pursue other branches during their college course. These students need the culture that comes by the study of language and literature, and this they must secure by the critical study of the English

language and by the study of the modern languages. Some of those who were graduated at our older colleges, and who appreciate the culture there gained, prefer for their sons the more practical course at the State College. This college, as now organized, fills a place in our general system of education that no other of our colleges can fill. It meets the wants of those who have been trained in our common schools, our high schools and our academies; but who have not pursued a course of preparatory study in Latin and Greek. It supplements the work in the English department of our high schools, as the older colleges supplement the work of the classic department.

It is evident that the State College must lack that organized support which the older colleges are able to secure through their graduates. Owing to the brief period during which the college has been established, its graduates are yet young men and comparatively few in number. They have not acquired that wealth and influence which will be theirs at the close of another decade, yet they have evinced a deep interest in the welfare of the college. They have begun to contribute liberally toward the establishment of a library fund for the college. The success of the graduates in their several fields of labor, and their zeal for the welfare of the college, augur well for its future.

But the college is not a private institution, and neither the alumni nor the trustees can so regard it. Its appeal must be to the people of the State, and this is just, for it is organized to meet their wants. It is not organized upon the basis of any mediaeval models. It is a State college, organized to serve the present interests of the people, by providing practical instruction for a large and increasing number of young men. It should be so liberally sustained, and the expense of attendance should be so reduced, that every boy in the State will consider it possible for him, by industry, frugality and faithful study, to find a path through it to competence and usefulness. It must be steadily adapted to meet the wants of our young men, especially of those who are to engage in the productive industries.

The question may here be put, "By thus broadening the field and the work of the college, will it not lose its value as

an ‘agricultural’ college?” In answer to this we may say, that if the institution is narrowed to the special needs of those who are to till the soil, it becomes a mere technical school, and loses the distinctive characteristics of a college. Every college must do something more than teach the technics of any employment, or it is no longer a college. The objects of study and training are two,—to form the man and to form the workman. The work of a college is, mainly, to develop manhood. The object of an agricultural college is to form men, and also to furnish special training for those who are to till the soil, or are to direct others in tilling the soil. No narrow structure was contemplated in the broad foundation proposed by the act of Congress, under which the Massachusetts Agricultural College was established. It has ever striven to make men, though it has often suffered the misfortune of being considered a mere training school for farmers. This view is degrading to the farmers and to their employment. Technical training without liberal culture subordinates the man to his employment, and tends to make him something less than a man. The full course of study, as now arranged, is needed by every young man who attends the college, whatever may be his future employment.

But the question may still be urged: “How is this college to aid the agricultural interests of the State?” In reply to this question, we would say that the college enables a large class of young men to prepare for wide usefulness who cannot pursue, or who do not wish to pursue, the courses of study in the older colleges. Through the intelligent labor of these graduates, agriculture and other productive industries of the State will receive fresh impulse, and will be more wisely developed.

The question may be asked: “How does this college promote the agricultural interests of the State as other institutions of the State do not?” We answer: —

1. By providing special opportunities for the culture and training of those engaged in agricultural pursuits, thus emphasizing the importance of such pursuits.

2. By recognizing the value of a thorough education for those engaged in agricultural pursuits. The day is past

when it can be said that a farmer needs little or no education beyond the ability to read, to write and to cipher. His success to-day depends upon his ability to understand the principles of physics involved in the machinery he uses. By means of the mechanical contrivances of our time, the farmer is now able to accomplish quickly with his horses what was once slowly accomplished by hand. The great advance in agricultural chemistry renders a knowledge of the principles of this science necessary to the farmer who would correctly note the changes in the laboratory of nature, and read the books and papers published to aid him in his work. The progress in the cultivation of fruits and vegetables renders it needful that he understand the laws of plant life. The study of botany is becoming more and more a necessity. The laws of animal life are also indispensable to him who would intelligently care for the animals in his charge.

But the college recognizes the fact that the farmer needs more than scientific and technical knowledge. He needs to know himself and his relations to his fellow-men. He needs to be able to wisely discharge the duties of citizenship. He needs to be a man qualified for that leadership in public affairs which in the past has secured to our land the wise counsel of her yeomanry.

3. By providing for that instruction and training in the field which is requisite to success in every department of agriculture. Agriculture is an art as well as a science, and hence it demands manual training.

4. By giving those engaged in agricultural pursuits an opportunity to gain a scientific education adapted to their needs. All the sciences taught in the college are taught in their relations to agriculture.

Every scientific principle taught in a college course must be presented in some of its applications in order to be understood. In the State College the applications are made in the several departments of agriculture and in kindred employments. We here touch one important difference between the proper work of the State College and the work of other institutions. For instance, the principles of chemistry are the same whether taught in one place or in another. The illustrations and the applications by which the principles are

taught and understood are not the same in every institution. In the State College the illustrations and applications relate to agriculture. The same is true of botany, and should be true of every department of science.

This is the only justifiable mode of teaching sciences in an agricultural college. This mode is none the less serviceable to those who are not to be farmers. There is no better way of understanding the sciences than by the illustrations and applications taken from the field. Those who are thus taught, whether their future employment is in the field, or shop, or office, cannot fail to be interested in agriculture, and may be expected to co-operate with farmers in devising better methods of developing the productive industries of the field.

But scientific training is not sufficient to form the true man, nor the wise leader of others. That one may wisely forecast the future, he must study the past. History properly finds its place in our curriculum. Every young man entering upon active life should know the social forces acting about him. Civil polity, political economy and kindred studies should not be disregarded in any college course. Every graduate should have knowledge of his own mental and moral powers, and the laws of their proper exercise. Hence studies that lead to this knowledge are wisely incorporated into the course of the college.

In the modern discussions respecting the value of scientific studies, the necessity of literary culture is too often overlooked or denied. No course of study is liberal from which is excluded that culture which is the result of the patient study of language and literature. This college excludes an extended course in the study of the ancient classics, hence the greater the necessity of providing other means of literary culture. Here, if nowhere else, the English language, both in its spoken and written forms, should be thoroughly studied. Because of their aid in a knowledge of the English language, and their help in its use, Latin, to some extent, French and German, should be patiently studied. There are many other evident reasons for the study of these languages at this college which it is unnecessary to mention. The thorough work which has been

done in the department of literature and language should be increased. Every student should be trained to accurate, effective and graceful expression, both oral and written. No one is prepared for the battle of life until he is ready to find solace, inspiration and guidance by converse, through our literature, with the great masters that have preceded us.

Nor is the course, as thus partially outlined, sufficient. Man is a religious being. The college should provide means of religious culture. The brief chapel exercise of each morning, and the Sabbath services now regularly held, together with such other means of religious culture as are now provided, we believe are essential to the highest welfare of every student.

GIFTS TO THE COLLEGE.

Gifts to Library.

From Leander Wetherell, of Boston, 1,410 bound volumes, including complete sets of Agricultural Reports of Ohio, New York, Vermont, and several hundred pamphlets.

From Herbert S. Carruth, of Boston, seventy volumes of latest publications in history, science and literature.

Gifts to Museum.

From the United States Fish Commission, a representative collection, numbering some two hundred species of the invertebrates of the coast.

From W. E. Rutherford, of Westhampton, a collection of one hundred and fifty specimens of birds' eggs, containing some quite rare species.

Gift to Botanical Museum.

From William S. Lyon, of Los Angeles, Cal., over two hundred specimens of the flora of California, to the herbarium of the college.

Gift to the College.

From the United States Government, a set of weights and measures, to be kept as a standard of authority. (Joint Resolution of Congress, March 3, 1881.)

IMMEDIATE NEEDS OF THE COLLEGE.

1. The North College is well-nigh unfit for occupancy. Repairs have been made from time to time, but, owing to the fact that the building was hastily and cheaply built, and has been subjected to constant wear for some fifteen years, it needs a thorough renovation. The estimated cost of the repairs and necessary improvements is \$5,000. Unless this building is put in good condition, it will be impossible to accommodate the next class that enters.

2. A house on the grounds, to be occupied by the president and his family, is an admitted necessity. President Chadbourne selected a site, and the trustees were planning to build, at the time of his death. At the time of the appointment of President Greenough, it was agreed to provide a house upon the grounds. A balance in the treasury of the college justified the trustees in beginning the house in August. As the funds of the college did not allow us to finish the building, nothing has been done upon it since the early days of November, when the first coat of plastering was put on. It did not seem wise to stop the work at an earlier stage. The amount expended upon the house is about \$2,000. The amount needed to pay outstanding bills, and to complete the house and the grading, will be \$6,000. It will be more economical for the State to complete this house than to continue the allowance for house-rent agreed to be paid to the president until it is finished. The main reason, however, for completing the house, is that the services of the president, when living on the grounds, will be of far more value to the college than they can be while he is obliged to live at a distance of a mile from the college.

3. The room now used as a chapel for morning and Sabbath services is part of the chemical building. The increased work in the chemical department of the college demands that the whole building shall at once be occupied by that department. In fact, much of the work incident to the Experiment Station is now accomplished with difficulty, because of the lack of room in the chemical building. Our present chapel room must be given up to the chemical department. Where, then, shall the students assemble for

morning service, for lectures and for Sabbath services? The only way of meeting this question is by the erection of a chapel. When this building is erected, provision should be made for a library. We have noticed elsewhere the gifts of Leander Wetherell, Esq., and others to the library. We have no suitable room in which to put these books. Hon. Marshall P. Wilder has agreed to place a set of books, which cost him upwards of \$500, in the library, as his gift. These books would be of great practical value to the college; but we cannot transfer them to Amherst until the State shall provide a suitable place.

During the month of December, in response to the solicitations of the President, several thousands of dollars were pledged, as a permanent fund for a library. Most of this was pledged by certain gentlemen now on the board of trustees of the college. If allowed, we would gladly give the names of those who have thus provided a permanent library fund. Three thousand dollars have been collected, but all of the remainder cannot be collected, nor the income used, unless a suitable place is provided for keeping the books. The alumni of the college are also moving to secure an alumni fund for the library. It is seldom that one of our State institutions has received such gifts as are now proffered. Whether these gifts shall be available depends upon the action of the present legislature.

In the accompanying reports some of the needed appliances by which the work of the several departments of the college can be made more effective, are specifically noted.

SCHOLARSHIPS.

The class that entered last September was, for the most part, made up of those admitted by competitive examination, in the several senatorial districts, under the direction of State senators.

The faithfulness of the senators in giving notice in their several districts, and in arranging for examinations, indicated an earnest purpose on their part to extend the usefulness of the college. Though the measure was new, and but partially understood in many sections of the State, sixty-six of those examined reached the required rank and were

admitted to the college. The lack of means and other circumstances have prevented some of these from attending. Upwards of fifty have been in attendance, constituting one of the best classes that was ever admitted to the college. This class will be increased by others who are soon to be admitted. The number admitted from Franklin County is larger than from any other county in the State.

CONCLUDING REMARKS.

Those who enter this college are, with few exceptions, young men who have learned by their own labor the value of money, and are disposed to make the most of their opportunities for study and personal improvement. They are worthy of more liberal provisions for their wants at the college than the State has yet made.

The members of the Faculty are something more than excellent instructors of classes; they care for the students individually, and the students, in turn, cordially co-operate with their instructors.

As the experiment station is now separate from the college, we present, in connection with the reports of the several departments of the college, a list prepared by Dr. Goessmann of the more important experiments carried on at the Massachusetts Agricultural College since 1870.

DEPARTMENT OF PRACTICAL AGRICULTURE.

President JAMES C. GREENOUGH.

SIR:—The following report on the course of instruction in this department, for the year 1883, is respectfully presented:—

In accordance with arrangements which assigned a part of my time to work in connection with the experiment station, my duties at the college have been strictly confined to instruction in the class room.

Owing to a revision of the courses of study, at the beginning of the year, it has been necessary to give instruction in special topics in a different order than that laid down in the regular course, to bring the standing of the several classes in agriculture in harmony with the curriculum published in the catalogue.

From the want of suitable text-books, instruction in agriculture must be given almost entirely by lectures, and a certain amount of mental discipline, particularly in the habit of concentrated systematic attention, is required on the part of the student to enable him to derive the greatest profit from them. For this reason, it seems desirable that the course in agriculture should not begin until the last term of the freshman year.

My aim has been, in all parts of the course, to give prominence to the practical principles of the art, which represent the accumulated experience of the best farmers.

The mission of science, in its relations to agriculture, in its several departments of physics,—chemistry, biology (including animal and vegetable physiology), and political

and social economy,— is to explain the established methods of practice, interpret the more exact results obtained in experiments, and to suggest new lines of experimental inquiry in regard to improved methods of practice.

The applications of science to agriculture have, therefore, been discussed with reference to their bearing upon questions of practical importance, and particular attention has been given to the results of experiments which have been made for the improvement of the art.

One of the leading objects, in the course of instruction in agriculture, is to develop in the student correct habits of observation, and give him a knowledge of the exact methods of experimentation which are required for the solution of the many problems that may present themselves in his practice. Empirical knowledge is thus brought in contact with a consistent interpretation of natural laws, and practice and science are thus made to go hand in hand in the class-room, as they must in the work of the farm, if the student is to receive the full benefits of an agricultural education. Theories are discussed with reference to their legitimate use as a means of investigation, and they are not presented as representing the aggregate of established truths.

In the second term of the year, lectures were given to the sophomore class (two hours a week, or nineteen exercises) on the history of agriculture, tracing the development of rules of practice,— pioneer farming and mixed husbandry,— and the properties and management of different soils.

The junior class had a course of lectures on animal husbandry (one hour each week).

The course of the senior class (two hours per week, or nineteen exercises) embraced methods of agricultural improvement, including experiments and how to conduct them, the methods and results of high farming, and the nitrification of soils, with the practical applications indicated in the results of experiments.

In the third term, lectures were given to the senior class (five hours per week, or forty-five exercises) on stock-breeding, mixed husbandry, drainage, and a general review of the course.

In the first term, the sophomore class had twenty-six

exercises in stock-breeding and animal motors, partly by lectures and partly with text-book.

The junior course consisted of twenty lectures on manures and crop rotations, and a course of lectures (twenty-six exercises) was also given to the senior class on stock breeding.

In addition to the regular class work, a number of illustrated lectures have been given to the students generally, and to the members of the Natural History Society, on topics relating to agriculture not embraced in the regular course.

Lectures to farmers' clubs have likewise been given in different parts of the State.

A class-room is very much needed for the use of this department, and it should have connected with it a room for apparatus and for preparing experiments to illustrate the course, and an agricultural museum.

The advantages of object teaching in the course of instruction in agriculture are largely lost from want of a class-room, where charts, models and selected specimens can be displayed to illustrate the subjects under discussion.

My large collection of stereopticon views of animal portraits and other objects, with a lantern for their exhibition, are of but little use in teaching, from the want of a suitable room in which they can be exhibited.

It is impossible to present to the student the detailed applications of the wide range of sciences relating to agriculture, in a form that will enable him to fully appreciate them, without the best possible facilities for illustrating the facts presented from so many sources.

MANLY MILES,

Professor of Agriculture.

REPORT OF J. W. CLARK,
FARM SUPERINTENDENT.

President JAMES C. GREENOUGH.

SIR:—I have the honor to submit my report of farm operations since April 1st, 1883. During the past year the farm was under the control of Mr. D. H. Tillson until April 1st, when it came under its present management. The plans for the season had been formed in part, so that little change was made in the general work of the farm; but from the first the aim has been to systematize the work so that it might be done with the least possible expense. In caring for the stock it has been insisted on that it should be done with regularity and by competent men, which shows a marked improvement in both the yield of milk and the condition of stock. A careful record of the number of pounds of milk given by each cow has been kept, and such as do not prove themselves profitable have been or will be disposed of just as soon as they do not pay for the food consumed; this being the only way that stock can be kept with profit. The boarding-house has been supplied with milk, and some sold to families living near the farm; the remainder has been set and the cream sent to the Amherst Creamery, which is found more profitable than making butter on the farm.

The crops grown the past season have been: corn, twelve acres; potatoes, four acres; fodder corn, one acre; carrots, one and one-half acres; mangels, one acre; Swedish turnips, one-half acre; buckwheat, six acres; wheat, two and one-half acres; rye, ten acres. The corn was so injured by the frost that not more than half a crop of sound corn was har-

vested. The buckwheat also gave promise of a large yield, but was injured by the frost. The root crops were all good. The greater portion of the land on which the rye was sown was low and wet, causing much of it to be thrown out and killed by the frost, in consequence of which the crop was light. The hay crop was below that of previous years, owing to the dry weather preventing the second crop, and the practice of selling hay and grain when it should have been fed upon the farm and the number of the stock increased. The crops of the farm should be fully double what they are at present. The soil of the farm is particularly adapted to grass, and the farm might be made one of the best dairy farms in the State, if the right course was taken to reclaim the wastes of the pasture and break up and re-seed some of the worn-out pieces of mowing, giving them a liberal dressing of manure and draining where it is needed. This will of necessity require considerable outlay, but it will be money well invested. A private individual could not afford to let his land remain in the condition of many acres on this farm, neither can the State afford it, and the sooner every available acre is made to produce a full crop, the sooner will the farm become a credit to the State and a paying investment. A beginning has been made the past season. About fourteen acres of land in the pasture that was ploughed the year before, and left without anything being sown upon it, has been re-ploughed and sown to rye and grass-seed, to furnish pasturing where the past year was nothing but smartweed, positively worthless for feed. Besides this, some sixteen acres of the pasture grown up to alders, briars, etc., have been grubbed out and ploughed, a part of it for the first time. This, well fitted, and sown to oats and grass-seed in the spring, will add fully thirty acres of feed to the pasture.

The stock of the farm consists of 27 head of Ayrshires, 3 grade cows, 2 yoke of steers, 1 yoke of cattle, 1 fine Guernsey bull,—a gift of Mr. W. A. Reed, of Hadley, Mass.,—and 1 Ayrshire bull presented by Ben. P. Ware, of Marblehead, Mass.; 3 horses, 20 Berkshire swine, 3 medium Yorkshires and 1 grade hog,—all of which, with

the exception of the last mentioned, are pedigree animals,— and 75 fowls.

In taking the inventory of stock, I have put the value according to the worth of the animal, and what it would sell for if placed on the market. In this way the value of the stock can be compared from year to year, without the uncertainty of fancy prices, for these vary greatly different seasons, and also with different breeders, one selling an animal for \$500 which another could not for \$100. I include in this report the inventory of stock, hay, grain, etc., as I found it April 1st, giving credit for all stock since sold and the price received. To the value of the young stock I have added from \$5 to \$15 each, according to the growth and condition of the several animals. The increased value of the steers is the increase in weight, reckoned at five cents per pound. Comparing the value of live stock of April 1st, 1883, with that of Jan. 1st, 1884, a balance is found in favor of Jan. 1st, 1884. The value of the hay, grain, roots, etc., will vary little from what it was Jan. 1st, 1883. The tools and vehicles have been taken at the value given last year, they being fully as valuable as then. Besides doing the regular farm work, the roads have been kept in order, grading has been done about the Drill Hall and other college buildings, the grounds have been kept in order, the cellar dug for the president's house and the grounds about it graded. The team-work of the experiment station has been done, the crops harvested, grading about its buildings and construction of the road upon its grounds. Besides having charge of the farm, I have given instruction in agriculture to the freshman class throughout the year, and also taken charge of class work.

The first great need of the farm is to settle upon some fixed plan for the future, to decide what branch of farming shall be carried on, and then to work for that, and not be shifting from one thing to another. The buildings and soil of the farm are adapted to stock farming, and money should be furnished with which to purchase fertilizers the coming spring, that more hay, grain and roots may be grown, that more stock may be kept, and in this way to improve the

farm by the increased amount of manure made: for the more stock kept, the more manure, and the more manure the greater will be the crops, and the larger the crops the more stock can be kept. The milk can be set and the cream taken every day by the Creamery Association, netting about $2\frac{1}{2}$ cents per quart for the milk set, and the skim-milk can be fed to swine and young stock; in this way returning nearly all of the valuable constituents of the food back to the farm, making it better and more productive each year.

Another need of the farm is suitable shed-room for the wagons and carts where it will be convenient, that all such property may be housed when not in actual use, and not be exposed to the weather as was the case the past summer. If the shed which now extends across the south side of the barn-yard were moved so as to form a continuation of the shed on the west side of the yard, a portion of it converted into a place for storing wagons, carts, etc., much space which is now of little use could be made valuable, and the barn-yard which is now nearly ruined by this shed, shutting out the sunshine, would be made comfortable during the winter months. One end of the shed should be made into a tenement for the help, and the farm be saved the expense of hiring a tenement for the men, off the farm. The Agricultural Department of the college needs more money than any other branch of the institution to place it on a level with the other departments. It has always been compelled to take a secondary place in importance, but the time has come when it should rank second to none, and money should be given for a building to be known as the Agricultural Hall, where different kinds of farm produce and implements can be brought together to be used for illustrations. The other departments of the institution have their collections to aid them in explaining or applying the subjects taught, and why not the agricultural? for a more useful and interesting collection could not be brought together than one composed of agricultural products and implements.

The farm account from April 1st, 1883, to Jan. 1st, 1884, without giving the farm credit for the improvement made in

the pasture, which cost at the lowest estimate \$175, or credit for other improvements, stands as follows :—

Expenses from April 1st, 1883, to Jan. 1st, 1884,	\$2,872 05
Cash received since April 1st,	\$1,333 17
Bills handed in " "	1,067 96
Bills due,	290 16
Increased value of stock since April 1st, . . .	177 25
	—————
	2,868 54
	—————
	\$3 51

Respectfully submitted,

J. W. CLARK.

REPORT OF THE BOTANIC DEPARTMENT.

J. C. GREENOUGH, *President.*

I have the honor to report the following upon the condition of the department under my charge.

Early in the year this department met with a great loss in the burning of the "Durfee Plant House" and the destruction of a large and very valuable collection of plants, including most of the stock for the propagation of bedding plants for the spring sales and for planting.

About 8 o'clock in the evening of January 23d, fire was discovered in the work-room, but it had gained such headway that nothing could save the main building. The students were soon on the grounds, and by the use of light snow, which was abundant, the two wings—the lily and stove rooms, and the propagating pits were saved, although the plants within them were very much injured. At this time the thermometer indicated 8° below 0°, and as soon as the flames were under control, stoves were procured, by which means, and covering the sides of the houses with mats the temperature within was kept above freezing until the boiler and pipes could be repaired, which was not until the afternoon of the 25th. The origin of the fire cannot be satisfactorily accounted for, but it undoubtedly started in a pile of wood not far from the large boiler.

The wings and the pits were at once temporarily repaired, and stock plants purchased for propagation for spring sales. The two most valuable plants in the collection, the sago and fan palms, were taken up as soon as possible the next morning, and although their tops were burned completely off, and they were exposed to extreme cold for more than twelve

hours they are now growing vigorously and in a few years will reach their original proportions.

During the summer and fall the parts of the building destroyed have been replaced by structures which are thought to be much more ornamental and are certainly more convenient and better adapted to the work of the department. The work-room which covers the furnace cellar is two stories high, the lower one being divided into two rooms, one for a reception or waiting and sales-room, and the other the work-room proper. In the second story two rooms have been fitted up for a study and sleeping room, while the north half is devoted to the purposes of a tool and work room. The foundation of this building was raised one foot higher than that of the one destroyed, and by removing two or three large piers and rearranging the heating pipes, more space has been obtained, and the risk from fire very greatly reduced.

The sales of flowers and plants for the remainder of the winter and spring was much less than it would have been but for this accident.

CROPS.

The crops, notwithstanding the drought, have been much better than last season. A detailed statement of the income is appended to this report.

IMPROVEMENTS.

Among the improvements made upon the grounds of the department are the draining of the land between the county road and the one leading by the Botanic Museum, and the springy side hill south-east from the plant houses. Nearly 2,000 feet of tile was laid in the most thorough manner in the former, and the land, which, before scarcely produced hay enough to pay for cutting, planted with corn, cabbages, squashes and turnips. The crops upon this land were very satisfactory, and it is now in the best possible condition for almost any farm crop. The side-hill lot was underdrained with stone-drains,—the stones being gathered from the orchard and other land on the hill east from the plant house. The drains are working perfectly and the land produced a fine crop of squashes.

The hot-beds, which were located west of the propagating house, have been removed to a more sheltered location south of the same, and the land graded and seeded and the collection of some twenty-five varieties of Japanese maples planted in groups or singly. More than the usual amount of work has been done the past season in keeping the roads and walks in good condition and in the decoration of the grounds.

WANTS.

One of the urgent needs of this department is a barn for keeping two horses, carriages, tools, etc., and for packing trees and shrubs during wet weather. A cellar is also needed for storing vegetables and fruit, and a portion of it for storing half-hardy trees and shrubs. The barn where the work horses and the heavy wagons and tools are now kept is fully occupied by them; the stable in the rear of the Botanic Museum will only accommodate one horse and hay enough to keep it for only three or four weeks, while the room is much needed for small tools of the department and for a work-room.

When the president of the college becomes located in his new house on the grounds, a stable will be needed to accommodate his horse and carriages also. These needs will require a building 40 by 60 feet, with 14 or 16 feet posts and a frost-proof cellar. For the construction of such a building timber for the frame can be easily and cheaply obtained from the chestnut grove near by, without injury to it, and pine lumber in large quantities is already on hand at the farm buildings.

Another urgent need is a complete set of gardening tools, independent of those used for the ordinary business of the department, which may always be on hand for illustration or educational purposes.

SOURCES OF INCOME FOR 1884.

In addition to the same sources of income as the past season, we have about one acre of asparagus, one and one-half acres of raspberries and blackberries, and about three-fourths of an acre of currants, all two years from planting. Besides the above, we have about 25,000 more peach trees

for sale than last year, and a much larger general nursery stock, and the orders now in indicate a very much larger sale than ever before. The land under cultivation is in a much improved condition, and having been kept quite clear from weeds for the past three years, can be cultivated at less expense. Nearly all the land to be planted next spring has been ploughed, which will greatly assist in the work of the spring.

FINANCIAL STATEMENT.

CASH DR.

Cash on hand Jan. 1st, 1883,	. . . . .	\$18 06
received for plants, .	. . . . .	1,096 48
flowers, .	. . . . .	338 74
vegetables, .	. . . . .	1,001 14
trees and shrubs, .	. . . . .	1,718 07
fruit, .	. . . . .	573 98
sundries, .	. . . . .	89 95
collected by Bursar, .	. . . . .	450 29
income of Hills fund, .	. . . . .	675 92
on hand Dec. 31st, .	. . . . .	7 58
Total cash income, .	. . . . .	\$5,970 21

To the above should be added credits as follows:—

Outstanding bills, .	. . . . .	350 65
Expense of draining side-hill lot, .	. . . . .	145 00
Expense of draining north lot, .	. . . . .	215 00
Work upon roads, walks, etc., .	. . . . .	102 50
Planting trees along roadway, .	. . . . .	20 00
Plants for decorating grounds of farm-house, etc., .	. . . . .	25 00
Increased value of produce on hand, .	. . . . .	25 00
Increased value of grain, .	. . . . .	35 00
Increased value of nursery stock, .	. . . . .	1,000 00
Value of seeds on hand, .	. . . . .	55 00
Total income, .	. . . . .	\$7,943 36

CASH CR.

Total cash paid out, .	. . . . .	6,822 39
Balance, .	. . . . .	\$1,120 97

S. T. MAYNARD.

APPENDIX.

LIST OF PLANTS DESIRED FOR EDUCATIONAL PURPOSES, TO REPLACE
THOSE DESTROYED BY FIRE.

<i>Illicium religiosum,</i>						
<i>Bixa orellana,</i>	.	.	.	.	.	<i>Arnotta.</i>
<i>Polygala Dalmaisiana,</i>						
<i>Camellia Japonica,</i>	.	.	.	.	.	<i>Double and single.</i>
“ <i>sasanqua,</i>	.	.	.	.	.	<i>Varieties.</i>
<i>Thea Bohea,</i>	.	.	.	.	.	<i>Black Tea.</i>
“ <i>veridis,</i>	.	.	.	.	.	<i>Green Tea</i>
<i>Hiptage mandablotia,</i>						
<i>Swietenia mahagoni,</i>	.	.	.	.	.	<i>Mahogany.</i>
<i>Hibiscus splendens,</i>						
“ <i>sinensis,</i>						
<i>Pistachia lentiscus,</i>	.	.	.	.	.	<i>Mastic tree.</i>
<i>Acacia melanoxyton,</i>						
<i>Indigo-fera tinctoria,</i>	.	.	.	.	.	<i>Indigo.</i>
“ <i>anil,</i>						
<i>Tamarindus Indicus,</i>	.	.	.	.	.	<i>Tamarind.</i>
<i>Myrtus communis,</i>	.	.	.	.	.	<i>Myrtle.</i>
<i>Lagerstroemia Indica,</i>	.	.	.	.	.	<i>Crape Myrtle.</i>
<i>Eryngium eburnum,</i>						
<i>Aralia papyrifera,</i>	.	.	.	.	.	<i>Paper aralia.</i>
<i>Coffea Arabica,</i>	.	.	.	.	.	<i>Coffee.</i>
<i>Posqueria longiflora,</i>						
<i>Montanoa hieracleifolia,</i>	.	.	.	.	.	<i>Tree Astor.</i>
<i>Stylium,</i>						
<i>Azalea Indica,</i>	.	.	.	.	.	<i>Single and double var.</i>
“ <i>Pontica,</i>						
<i>Volkameria acauleata,</i>						
<i>Cobea scandens variegata,</i>						
<i>Stephanotus floribundus,</i>						
<i>Olea sativa,</i>	.	.	.	.	.	<i>Olive.</i>
<i>Mackaya bella,</i>						
<i>Laurus camphora,</i>	.	.	.	.	.	<i>Camphor tree.</i>
“ <i>cinnamomum,</i>	.	.	.	.	.	<i>Cinnamon “</i>
<i>Grevillea asplenifolia,</i>						
<i>Piper nigra,</i>	.	.	.	.	.	<i>Black pepper.</i>
“ <i>betel,</i>	.	.	.	.	.	<i>Betel “</i>
“ <i>cubeba,</i>	.	.	.	.	.	<i>Cubeb “</i>
<i>Stenocarpus Cunninghamii,</i>						

<i>Manihot utilissima</i>,	.	.	.	.	<i>Tapioca.</i>
<i>Croton pictum</i> ,					
<i>Artocarpus Indicus</i>,	.	.	.	.	<i>Bread-fruit.</i>
<i>Ficus elasticus</i>,	.	.	.	.	<i>India rubber.</i>
<i>Siphonia elastica</i>,	.	.	.	.	<i>Caoutchouc.</i>
<i>Damara australis</i>,	.	.	.	.	<i>Broad leaved pine.</i>
<i>Cycas circinalis</i>,	.	.	.	.	<i>Sago cycad.</i>
<i>Zamia tenuifolia</i> ,					
<i>Phoenix dactylifera</i>,	.	.	.	.	<i>Date palm.</i>
<i>Cocos nucifera</i>,	.	.	.	.	<i>Cocoa-nut palm.</i>
<i>Elaeis guineensis</i>,	.	.	.	.	<i>Oil</i> “
<i>Areca catechu</i>,	.	.	.	.	<i>Betel</i> “
<i>Sagus laevis</i>,	.	.	.	.	<i>Sago</i> “
<i>Caryota urens</i>,	.	.	.	.	<i>Sugar</i> “
<i>Ceroxylon audicolor</i>,	.	.	.	.	<i>Wax</i> “
<i>Phytelphus macrocarpa</i>,	.	.	.	.	<i>Ivory</i> “
<i>Calamus Rotang</i>,	.	.	.	.	<i>Rattan</i> “
<i>Zinziber officinalis</i>,	.	.	.	.	<i>Ginger.</i>
<i>Maranta arundinacea</i>,	.	.	.	.	<i>Arrow-root.</i>
<i>Testudinaria elephantipes</i> ,					
<i>Diosperus ebenum</i>,	.	.	.	.	<i>Ebony tree.</i>
<i>Victoria regia</i>,	.	.	.	.	<i>Amazon lily.</i>
<i>Papyrus antiquorum</i>,	.	.	.	.	<i>Paper papyrus.</i>
<i>Nymphaea coerulea</i>,	.	.	.	.	<i>Blue lily.</i>
<i>Ouverandria fenestralis</i>,	.	.	.	.	<i>Lace leaf.</i>
<i>Dicksonia antartica</i>,	.	.	.	.	<i>Tree fern.</i>
<i>Alsophylla Australis</i>,	.	.	.	.	<i>Tree fern, 6 ft. high.</i>
<i>Platycerium grande</i>,	.	.	.	.	<i>Stag-horn Fern.</i>
<i>Dendrobium nobile</i> .					

CHEMICAL DEPARTMENT.

J. C GREENOUGH, *President.*

The instructions in theoretical and practical chemistry during the past year have been given in conformity to the curriculum of the college. It has been the aim of the instructor to make the instructions as practical as time and circumstances admitted. The elements were treated with reference to their importance in science and art; and the illustrations were chosen with a design to promote the special object of the institution,— to prepare the student for the various branches of industry, and of agriculture in particular. The instructions in the lecture-room are followed by practical observations in the laboratory. The characteristics of the various elements, and their most important compounds are studied by chemical analysis. Mineral substances prominent in the sciences and arts, as well as in agriculture are carefully tested, and their constituents ascertained. As soon as the student has become familiar by personal observation with the general qualities of many of these compounds, is competent to recognize the more common elements in their various combinations, and comprehends the working of the chemical laws in mineral matter, he receives a course of instruction in organic chemistry. Lectures in chemistry, applied in the sciences and arts, and especially in agriculture, finish the course of instruction.

The following regular class instructions have been given during the past year: The Sophomore class has attended one term of lectures and recitations in elementary chemistry on metallic elements. The Junior class has received for two terms, instructions in analytical chemistry, on the modes of ascertaining the constituents of industrial products. The

Senior class has studied for one term the composition of ores, ashes, fertilizers, and soils.

Besides this regular class exercise, a considerable amount of work has been carried on by special students in chemistry, and by post-graduates of the college.

The rooms of the chemical department of the college which have been spacious enough during past years, will be insufficient to meet the demands of incoming larger classes, and of the experiment station.

As it will be impossible to accommodate satisfactorily both institutions a year hence, it seems most desirable that action should be taken soon, to meet the growing wants of the chemical department of the college in regard to additional rooms and permanent assistance.

C. A. GOESSMANN.

EXPERIMENTS

CARRIED ON AT THE MASSACHUSETTS AGRICULTURAL COLLEGE
SINCE 1870.

The growing of sugar-beets, the manufacture of sugar from them, and trials of their value for cattle foods. This industry is soon to grow up in our midst, and to absorb large amounts of capital.

The sources of supply, and the quantity and quality of our manurial agents. These careful scientific investigations have been the prime means of revolutionizing the manufacture and trade in fertilizers, not only in this State, but throughout the country.

Laboratory and physical examinations of the South Carolina phosphates, and trials of their agricultural value in the raw state, and after treatment with acids.

On the use and effect of common salt, on grain and root crops.

The chemical and physical condition of the salt marshes of the State, and the devising of methods by which they can be made available for agricultural purposes.

Experiments with compound commercial fertilizers, to test their comparative agricultural value, and their value as compared with single elements.

To determine what elements will make practically a complete manure, on our average soils.

Investigations of the quality and composition of commercial fertilizers offered for sale, and the protection of the community by legal control and inspection from frauds in them.

Observations and study of the phenomena of plant-life.

The circulation of sap in plants, and their expansive power during growth.

To determine the proportions of different elements of nutrition in feeding substances to be used to save needless expense, and to produce the most certain results.

Experiments on the continuous growth of crops, on the same soil, with chemical fertilizers alone.

The influence of different kinds of fodder-plants fed to milch cows on the quality and quantity of their milk and butter.

Contribution to the chemistry of American wild and cultivated varieties of grape-vines.

Investigations of dairy products,—oleo-margarine, Jersey, and skim-milk cheese.

Examinations of animal secretions; variety of urinary calculi, etc.

Examinations of various vegetables and fruits.

Examinations of varieties of sugar-beets raised throughout the State of New York, Lower Canada, and the Connecticut River Valley.

Investigations concerning the saccharine qualities of several varieties of corn and melons.

Examinations and trials to test the comparative value of different methods of setting and treating milk in the butter-dairy.

Practical trials of new implements, and a great variety of farm machinery.

Investigations as to the effect of girdling fruit-trees and plants to hasten the time of ripening, and to improve the quality of the fruits.

The effect of chemical salts on the carbo-hydrate contents of plants, and the quality of the fruits.

The construction and repair of common roads.

The growing of early-amber cane, and the manufacture of sugar from its juice.

The influence of temperature, and the vital functions of plants, and temperature of soils and air, on the changes in form of water in soils, and plants and vapor in air.

Investigations in relation to the evaporation and percolation of water from the soil.

The tilling of soils of different characteristics, as affecting the loss of water by evaporation.

The determination of the elements of plant nutrition lost from the soil by leaching, and of those it retains.

Investigations in relation to the comparative temperature of the soil and air by day and by night.

The establishment of true meridian lines, to regulate the practice of surveying.

The comparative study of milk of different breeds of cows.

Accurate investigations of the comparative nutritive and feeding value of Northern, Southern and Western varieties of Indian corn,

Experiments regarding diseased peach trees, yellows, etc.

Experiments regarding the influence of special manures on fruits, etc.

MATHEMATICS AND PHYSICS.

The work of the mathematical department during the past year has been conducted upon the plan indicated in the last annual report. The only variation in the amount or order of work indicated in that schedule was the substitution of nine hours instead of five hours for instruction in surveying during the third term. Much of this time was occupied in actual field practice, making surveys by various methods, and plotting and calculating areas from the notes. The revised course increases slightly the time devoted to mathematical studies, but the changes are so immaterial that the schedule presented in the present report may be referred to for an outline of the work of this department during the past as well as the present year.

Some obstacles to satisfactory work in this department still present themselves. Although the average scholarship of the present freshman class is creditable, and in the case of a few individuals very gratifying, there is a greater diversity of ability and attainment than is noticeable in institutions whose students have all been subjected to a somewhat uniform course of preparatory training. As a result, there is difficulty in allotting work sufficiently rigid to properly occupy the better trained members of the class, which shall not overburden and discourage the less forward ones. This evil manifests itself especially in the study of algebra. The progress of the class during the past term has therefore been retarded by the necessity of an effort to bring the poorly trained students into line. It is impossible to entirely obviate this difficulty by increasing the requirements for admission. The remedy lies in the hands of the teachers of high schools throughout the State, upon whom

rests the responsibility of giving a thorough drill in the principles and operations of elementary algebra to all young men anticipating membership in this college.

Another obstacle is the deficiency in the apparatus for illustrating sound, heat and light, branches of science which especially require demonstration to the senses. An adequate enlargement of the physical cabinet is certainly one of the most stringent needs of the institution.

The mathematics comprise the chief disciplinary studies of the course; therefore my first aim is to develop in the students the mental habit of exactness, not only indispensable for mastery of the pure mathematics, but the first requisite for successful pursuit of all branches of science. My second aim is to introduce such exercises as will stimulate ingenuity and originality. My third aim is to give a practical bearing to all studies, by means of experiment and illustration drawn from familiar fields of observation.

The trustees and other friends of the institution will be very welcome at the class exercises of the mathematical department. Such manifestation of interest would gratify and stimulate both students and instructor.

AUSTIN B. BASSETT.

DEPARTMENT OF ENGLISH AND THE MODERN LANGUAGES.

President JAMES C. GREENOUGH.

SIR :—I have the honor to submit the following report of the department of modern languages and English literature.

The course as now established does not differ materially from that of preceding years. Its most essential feature is the making optional the study of French and German. The change in the time of commencing these studies, making them coincide with the opening of the college year, cannot fail to be of practical advantage to the student, allowing him three consecutive terms of work without the intervening of the long summer vacation. The method of instruction pursued has been the same in both languages, the object being to secure fluency and ease in translation rather than to make finished scholars. To this end the first term has been devoted to mastering the general principles of grammar, the rules for pronunciation, and the reading of some light, easy work. In the second term, more advanced translation has been attempted, usually from some standard author in fiction or history ; while in the third, the selection has been made of a scientific work, which should combine practice in translation with information in some one of the various departments of agriculture. In this way have been read, among other books, Puy — Plants under Glass ; Marion — Wonders of Vegetation ; Vaulx — What Constitutes a Dairy ; Schleiden — Plant-Life ; Prosch — Breeding and Care of Cattle ; Peschel — Physical Geography.

The instruction in English literature has been partly oral

and partly by the study of a text-book. A series of lectures on the great race epochs of English history opened the course, and the text-book has been supplemented by lectures at the close of each literary period. English history and English literature have been, as far as practicable, taught together, and it has been the constant aim to make the one the complement of the other.

MILITARY DEPARTMENT.

JAMES C. GREENOUGH,

President of the Massachusetts Agricultural College.

SIR:—I have the honor to submit the following brief report, and to append the theoretical and practical course of the military department, with the names and grades of those holding official places in the present battalion organization.

It is a pleasure to note a general improvement in all which pertains to this department. A building enclosing recitation-room, office, armory and an ample drill-hall has finally been completed. Its tasteful design adds much to the appearance of the grounds, and it at once embodies and supplies the needs which have been particularly apparent in winter, a season which inclines the student to the least exercise. Much of the old regalia, as hats, plumes, sashes, has been replaced by new. A small but growing military library, thoroughly interesting to all, has been established. A few samples of powder, shells, fuzes, etc., form the basis of a museum which, improved, will materially aid in giving the student proper ideas of Ordnance. The interest, discipline and information of the students are constantly improving, and the present assurance of larger classes is the sure precursor of still greater advancement. In considering the scope of this department, the plan thus far followed has been to take a middle course in discipline and instruction between a distinctly military institution like our National Academy, and the ordinary literary college. Due recognition is given to the claims of the United States, its purpose in founding this and similar colleges,—and to the fact that the student after graduation is not identified with, dependent upon or especially aided by the government. The tactical instruc-

tion has therefore been confined to the time devoted by the best colleges to calisthenics. The student acquires with his physical exercise what will be of mutual profit to his country and himself in case of need. Should our volunteer soldiery be called into active service, the average graduate of this college could not fail to secure an honorable position at once. The varied drills, mainly in the open air, besides exercising every part of the body, and under the most favorable circumstances, for health, — have a purpose beyond the development of the mere physical man. The student must use his reason, his voice, his body. He must control himself as well as others. The artillery, mortar, company, skirmish and battalion drills have each their different commands, different formations and distinctive objects. They are alike only in requiring exact discipline, quick and implicit obedience from the instructed ; from the instructors, — usually seniors, — a comprehension of their purposes and a capacity to control and command obedience from others. To be straightened into “the position of the soldier,” *once*, is to be benefited ; and no estimate can be made of the good derived by those who even reluctantly are brought to a regular methodical course of drills for four years. These matters are not sufficiently considered when boys are sent away from their homes for an advanced education. The weekly inspection of the dormitories, and the daily inspection at all drills, are calculated to remedy the careless tendencies of students by the enforcement of personal neatness, which is the basis of a proper, healthful and instructed life. Tactical studies are taken in regular course, but not to exceed one hour per week during the first term of each school year for each of the junior classes. The time thus employed, as it is distributed is scarcely missed, and more perfected practical instruction is thus permitted. The studies pursued by the seniors, amounting to two hours each week through the year, alone take appreciable time from the students. They are arranged to include the elements of fortifications and ordnance, especially useful in war, — a brief survey of Constitutional and military law, and much important history, by the review of prominent campaigns of ancient and modern times. It is not desired to give exact information concerning

marches, camping, field fortifications, and such other matters as would be of especial importance to field and company officers in the service; but rather to excite some taste for the future reading of military works, than to go into the reasons for intricate strategic movements. It is hoped that the State or general government will respond to a demand for a second platoon of field pieces, which the increasing numbers in the lower classes will soon require. It is proposed, commencing with the next school year, for obtaining more perfect quiet in the dormitories during study hours, to place cadet officers, under proper regulations, in control of the different entries. The best results are anticipated where interest and the confidence reposed, combine to urge a strict compliance with the requirements. I take this opportunity of urging that a more intimate connection be recommended to His Excellency the Governor, between this corps as an organization and the State militia. Massachusetts takes much merited pride in her present organization, and a wisdom among legislators and officials which recognizes the necessity of having an experienced body of State troops ever ready,—must see the desirability of giving the students of the *State College*, where military duties are an essential feature, an opportunity for a few weeks camp life, yearly. It seems practical that this corps should be placed on the same footing with regimental organizations of the State, transported to Framingham, and paid at the same rates as the same grades in the militia. Two weeks yearly in camp, at a convenient time in the summer, would be of the greatest advantage. The few hundreds thus expended would be an economical outlay, and some additional interest might be excited in the State college, and in the students who seek an education there which prepares them at once to be intelligent men in peace and valuable soldiers in war.

Very respectfully,

Your obedient servant,

VICTOR A. BRIDGMAN,

1st Lieut. 2d U S Artillery,

Prof. of Military Science and Tactics

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

THEORY.

Fall term, Freshman year. One hour per week for the term. Recitations in infantry tactics (Upton's). School of the Soldier. School of the Company. Skirmish drill.

Fall term, Sophomore year. One hour per week for the term. Recitations in U. S. Artillery tactics. School of the Soldier (dismounted), sabre exercise, manual of the piece and mechanical manœuvr  s, bayonet exercise (infantry tactics). Ammunition, equipment of carriages. Modified service of 8-inch mortars.

Fall term, Junior year. Recitations in infantry tactics (Upton's). One hour per week for the term. School of the battalion. Ceremonies. Company and field service.

MILITARY SCIENCE.

This instruction is given to seniors, extending through the entire college year, two hours per week.

It will include, in the form of lectures and recitations from selected text-books, the following subjects : — Ordnance and Gunnery; constitutional and military law and history; campaigns and battles; systems of warfare, present and past; an elementary course in strategy and engineering. It will be modified by such additions and changes as shall seem desirable. Essays are required from each senior on military subjects, when they have become sufficiently instructed to prepare them advantageously. These papers will be read in the recitation room for general note and criticism, or before the entire college. One set, all upon the same subject, are written for prizes, — the award being made by a board of army officers. The successful competitors read their productions at the graduating exercises. Subject for the class of 1883, Military education as a factor of American government.

The competition of the class of 1883 resulted as follows : —

BOARD OF AWARD.

First Lieutenant C. A. L. Totten, Fourth Artillery.

First Lieutenant A. B. Dyer, Fourth Artillery.

Lieutenant H. A. Springett, Fourth Artillery.

Subject.

Military Education as a Factor of American Government.

Award.

First prize, \$25. J. B. Lindsey, Marblehead.

Second prize, \$15. S. M. Holman, Jr., Attleborough.

Especial Mention.

S. C. Bagley, Boston, and E. A. Bishop, Diamond Hill, R. I.

PRACTICE.

All students, unless disqualified physically, are required to attend prescribed military exercises, those who pursue special or partial courses at the college not being exempt so long as they remain at the institution. By the commencement of their second term, students are required to provide themselves with a full uniform, comprising coat, blouse, trowsers, cap, white gloves, etc., all of which costs about \$30. Correctness of deportment and discipline are required of all, the routine of the West Point Academy being followed as closely as circumstances will permit. To insure a proper sanitary condition of the college, the commandant makes careful inspections of all rooms and college buildings each Saturday morning, during which all students in full uniform are required to be in their rooms, for the proper police of which they are held to a strict accountability.

At the beginning of each term, issues of such equipments as they will require are made to all students. They will be charged for all injury, loss, and for any neglect in the care of the same.

For practical instruction, the following public property is in the hands of the college authorities : —

One platoon of light Napoleons (dismounted).

One six-pounder with limber and equipments.

Seventy-five sabres and belts.

One hundred and fifty breech loading rifles (cadet model).

Several accurate target rifles.

Two 8-inch siege mortars, with complete equipments.

For practice firing, the United States furnishes blank-cartridges for all guns, and ball-cartridges for rifle practice, which is encouraged by the department.

Drills, amounting to rather less than four hours per week, are as follows :—

Infantry : schools of the soldier, company, and battalion ; manual of arms, and sword ; bayonet exercise, skirmish drill, target practice ; ceremonies, marches, field service.

Artillery : schools of the soldier, detachment, and battery (dismounted). Mortar drill, sabre exercise, pointing, and field service.

BATTALION ORGANIZATION.

For instruction in infantry tactics and discipline, the cadets are organized into a battalion of two or more companies under the commandant. The officers, commissioned and non-commissioned, are selected from those cadets who are best instructed and most soldier-like in the discharge of their duties. As a rule, the commissioned officers are taken from the seniors, the sergeants from the juniors, and the corporals from the sophomores. All seniors are detailed to act as commissioned officers.

Commissioned Staff.

J. E. GOLDFTHWAIT, *First Lieut. and Adjutant.*

H. D. HOLLAND, *First Lieut. and Quartermaster*

Non-commissioned Staff.

G. H. BARBER, *Sergeant-Major.*

C. W. BROWNE, *Quartermaster Sergeant.*

Color Guard.

Sergeants — E. R. FLINT, *National Colors* ; H. HOWELL, *State Colors*.

Corporals — G. W. WHEELER; C. W. CLAPP; K. SANBORN

Privates — L. J. DE ALMEIDA; J. A. NASH; E. D. WINSLOW.

Captains.

C. HERMS, Co. A.

E. A. JONES, Co. B.

Lieutenants.

L. SMITH, Co. A. G. H. PUTNAM, Co. A. E. W. ALLEN, Co. B.

First Sergeants.

P. C. P. BROOKS, Co. A.

C. S. PHELPS, Co. B.

Sergeants.

E. R. FLINT, Co. A.

H. HOWELL, Co. B.

C. S. CUTTER, Co. A.

B. TEKIRIAN, Co. B.

*Corporals.*A. L. KINNEY, Co. A. C. W. CLAPP, Co. A. K. SANBORN, Co. A.
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CATALOGUE

OF

TRUSTEES, OVERSEERS, FACULTY AND STUDENTS,

1883.

CALENDAR FOR 1884.

The third term of the collegiate year begins April 9th and continues till June 25th.

The first term begins Wednesday, Sept. 10th, and continues till Dec. 18th.

The second term begins Jan. 7th and continues till March 31st, 1885.

There will be an examination of candidates for admission to the college, at the Botanic Museum, at 9 A.M., Tuesday, June 24th, and also on Tuesday, Sept. 9th.

The Farnsworth Prize Declamations take place Monday evening, June 23d.

The public examination of the graduating class for the Grinnell Prize for excellence in Agriculture, will take place on Tuesday forenoon, June 24th.

The exercises of Graduation Day occur June 25th.

TRUSTEES, OVERSEERS, FACULTY AND STUDENTS.

BOARD OF TRUSTEES.

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HIS EXCELLENCY GEO. D. ROBINSON, *Governor of the Commonwealth.*
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JOHN E. RUSSELL, *Secretary of Board of Agriculture.*

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JAMES S. GRINNELL,	GREENFIELD.
BENJAMIN P. WARE,	MARBLEHEAD.
O. B. HADWEN,	WORCESTER.
GEORGE NOYES,	BOSTON.
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EDWARD C. CHOATE,	SOUTHBOROUGH.

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HENRY COLT OF PITTSFIELD.

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DANIEL E. DAMON,	of Plymouth.
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JONATHAN BUDDINGTON,	of Leyden.

MEMBERS OF FACULTY.

PAUL A. CHADBOURNE, D. D., LL. D.,

*President.**

JAMES C. GREENOUGH, M. A.,

*President.**College Pastor and Professor of Mental and Moral Science.**Provisional Instructor of Political Economy and History.*

LEVI STOCKBRIDGE,

Honorary Professor of Agriculture.

HENRY H. GOODELL, M. A.,

*Professor of Modern Languages and English Literature.**Provisional Instructor of Rhetoric and English Composition.*

CHARLES A. GOESSMANN, PH. D.,

Professor of Chemistry.

SAMUEL T. MAYNARD, B. S.,

Professor of Botany and Horticulture.

AUSTIN B. BASSETT, A. B.,

*Professor of Mathematics and Physics.**Provisional Instructor in Elocution.*

MANLY MILES, M. D.,

*Professor of Agriculture.**Professor of Comparative Anatomy and Veterinary Science.*

* Died February 23, 1883.

FIRST LIEUT. VICTOR H. BRIDGMAN, Second Artillery, U. S. A.,
Professor of Military Science and Tactics.

HORACE E. STOCKBRIDGE, PH. D.,
Assistant Professor of Chemistry.

JOHN F. WINCHESTER, D. V. S.,
Lecturer on Veterinary Science and Practice.

ROBERT W. LYMAN, Esq.,
Lecturer on Rural Law.

EDWARD HITCHCOCK, JR., M. D.,
Special Instructor in Elocution.

WINFRED A. STEARNS, A. B.,
Instructor in Entomology.

FREDERICK TUCKERMAN, M. D.,
Instructor in Physiology.

JOHN W. CLARK, B. S.,
Farm Superintendent and Instructor in Agriculture.

LEVI R. TAFT, B. S.,
Bursar and Assistant Professor in Horticulture.

GRADUATES OF 1883.*

Bagley, Sydney Currier,	Boston.
Bishop, Edgar Allen (Boston Univ.),	Diamond Hill, R. I.
Braune, Domingos Henrique,	Nova Friburgo, Brazil.
Hevia, Alfred Armand (Boston Univ.),	Havana, Cuba.
Holman, Samuel Morey, Jr. (Boston Univ.),	Attleborough.
Lindsey, Joseph Bridgeo (Boston Univ.),	Marblehead.
Minott, Charles Walter (Boston Univ.),	Westminster.
Nourse, David Oliver (Boston Univ.),	Bolton.
Preston, Charles Henry (Boston Univ.),	Danvers.
Wheeler, Homer Jay (Boston Univ.),	Bolton.
Total,	10

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the college during any portion of the year 1883.

SENIOR CLASS.

Herms, Charles,	.	.	.	Louisville, Ky.
Holland, Harry Dickinson,	.	.	.	Amherst.
Jones, Elisha Adams,	.	.	.	Rockville.
Owen, Henry Willard,	.	.	.	Amherst.
Smith, Llewellyn,	.	.	.	Amherst.
Total,	.	.	.	5

JUNIOR CLASS.

Allen, Edwin West,	.	.	.	Amherst.
Almeida, Luciano José de,	.	.	.	Bananal, São Paulo, Brazil.
Barber, George Holcomb,	.	.	.	Glastonbury, Ct.
Brooks, Paul Cuff Phelps,	.	.	.	Boston.
Browne, Charles William,	.	.	.	Salem.
Buffington, Charles Owen,	.	.	.	Ware.
Chadbourne, Albert Hopkins,	.	.	.	Amherst.
Cutter, Charles Sumner,	.	.	.	Arlington.
Flint, Edward Rawson,	.	.	.	Boston.
Goldthwait, Joel Ernest,	.	.	.	Marblehead.
Howell, Hezekiah,	.	.	.	Blooming Grove, N. Y.
Leary, Lewis Calvert,	.	.	.	Amherst.
Nash, John Adams,	.	.	.	Amherst.
Phelps, Charles Shepard,	.	.	.	West Springfield.
Putnam, George Herbert,	.	.	.	Millbury.
Spaulding, Charles Plumb,	.	.	.	Amherst.
Taylor, Isaac Newton, Jr.,	.	.	.	Northampton.
Tekirian, Benoni,	.	.	.	Yozgad, Turkey.
Whittemore, Joseph Sidney,	.	.	.	Leicester.
Total,	.	.	.	19

SOPHOMORE CLASS.

Atkins, William Holland,	.	.	.	Westfield.
Ayres, Winfield,	.	.	.	Oakham.
Barker, John King,	.	.	.	Three Rivers.
Bement, John Emery,	.	.	.	North Amherst.
Carpenter, David Frederic,	.	.	.	Millington.
Clapp, Charles Wellington,	.	.	.	Montague.
Copeland, Alfred Bigelo,	.	.	.	Springfield.
Doucet, Walter Hobart,	.	.	.	Philadelphia, Penn.
Eaton, William Alfred,	.	.	.	Piermont-on-Hudson, N. Y.
Felt, Charles Frederic Wilson,	.	.	.	Northborough.
Fowler, John Henry,	.	.	.	Westfield.
Kinney, Arno Lewis,	.	.	.	Lowell.
Lang, Charles Joseph,	.	.	.	Washington, D. C.
Leland, William Edwin,	.	.	.	Grafton.
Mackintosh, Richards Bryant,	.	.	.	Dedham.
Palmer, Robert Manning,	.	.	.	Brookline.

Sanborn, Kingsbury,	.	.	.	Lawrence.
Smith, Walter Storm,	.	.	.	Syracuse, N. Y.
Stone, George Edward,	.	.	.	Spencer.
Stone, George Sawyer,	.	.	.	Otter River.
Wheeler, George Waterbury,	.	.	.	Deposit, N. Y.
Winslow, Edgar Daniel,	.	.	.	Ware.
Total,	.	.	.	22

FRESHMAN CLASS.

Allen, Frederick Cunningham,	.	.	.	West Newton.
Almeida, Augusto Luis de,	.	.	.	Bananal, São Paulo, Brazil.
Ateshian, Osgan Hagope,	.	.	.	Sivas, Turkey.
Avery, David Ebenezer,	.	.	.	Plymouth.
Ball, William Monroe,	.	.	.	Amherst.
Barrett, Edward William,	.	.	.	Milford.
Bond, Richard Henry,	.	.	.	Brookline.
Breen, Timothy Richard,	.	.	.	Ware.
Brown, Herbert Lewis,	.	.	.	Peabody.
Caldwell, William Hudson,	.	.	.	Peterborough, N. H.
Carpenter, Frank Berton,	.	.	.	Leyden.
Chapin, Clinton Gerdine,	.	.	.	Chicopee.
Chase, William Edward,	.	.	.	Warwick.
Clarke, Frank Scripture,	.	.	.	Lowell.
Cushman, Ralph Henry,	.	.	.	Bernardston.
Daniels, Joseph Frank,	.	.	.	Somerville.
Davis, Fred Augustus,	.	.	.	Lynn.
Duncan, Richard Francis,	.	.	.	Williamstown.
Felton, Truman Page,	.	.	.	Berlin.
Fisherwick, Cyrus Webster,	.	.	.	Palmer.
Fowler, Fred Homer,	.	.	.	North Hadley.
Hathaway, Bradford Oakman,	.	.	.	New Bedford.
Howe, Clinton Samuel,	.	.	.	Marlborough.
Kasmire, George Frank,	.	.	.	New Bedford.
Long, Stephen Henry,	.	.	.	East Shelbourne.
Marsh, James Morrill,	.	.	.	Lynn.
Marshall, Charles Leander,	.	.	.	Lowell.
Martin, Joseph, second,	.	.	.	Marblehead.
Meehan, Thomas Francis Benedict,	.	.	.	Boston.
Merchant, Charles Eddy,	.	.	.	East Weymouth.
Merritt, Walter Heston,	.	.	.	Amherst.
Nourse, Silas Johnson,	.	.	.	Bolton.
Osterhout, Jeremiah Clark,	.	.	.	Lowell.
Paine, Ansel Wass,	.	.	.	Boston.
Rice, Thomas, second,	.	.	.	Shrewsbury.
Rideout, Henry Norman Waymouth,	.	.	.	Quincy.
Robinson, George Prescott,	.	.	.	Northampton.
Rose, Newton Augustus,	.	.	.	Fitchburg.
Shaughnessy, John Joseph,	.	.	.	Stowe.

Stone, Fremont Ernest,	Heath.
Tolman, William Nichols,	Concord.
Torelly, Firmino da Silva,	Rio Grande do Sul, Brazil.
Tucker, Frederick Deming,	Monson.
White, Herbert Judson,	Wakefield.
Total,	44

POST-GRADUATES.

Brewer, B.S., Charles,	Amherst.
* Floyd, B.S., Charles Walter (Boston Univ.),	Boston.
Groeger, Gustavus (Univ. of Vienna),	Amherst.
Hills, B.S., Joseph Lawrence (Boston Univ.),	Boston.
Jaqueth, Isaac Samuel,	Liverpool, N. Y.
Kingman, B.S., Morris Bird,	Amherst.
Lindsey, B.S., Joseph Bridgeo (Boston Univ.),	Marblehead.
Myrick, B.S., Lockwood,	Concord.
Nourse, B.S., David Oliver (Boston Univ.),	Bolton.
Preston, B.S., Charles Henry (Boston Univ.),	Danvers.
Taft, B.S., Levi Rawson (Boston Univ.),	Amherst.
Washburn, B.S., John Hosea (Boston Univ.),	Mansfield, Ct.
Wheeler, B.S., Homer Jay (Boston Univ.),	Bolton.
Total,	13

SUMMARY.

Post-Graduates,	13
Graduates of 1883,	10
Senior Class,	5
Junior Class,	19
Sophomore Class,	22
Freshman Class,	44
Total,	113

GRADUATES.

Allen, Francis S., '82, 141 West Fifty-fourth St., New York City, Student, American Veterinary College.

* Died October 10, 1883, of consumption.

- Allen, Gideon H., '71, Winfield, Cowley Co., Kans., Agent, Wells, Fargo & Co.'s Express.
- Aplin, George T., '82, East Putney, Vt., Farmer.
- Bagley, David A., '76.
- Bagley, Sydney Currier, '83, 62 Sudbury St., Boston, Clerk and Assistant Gary Magneto-Signal Co.
- Baker, David E., '78, Newton Lower Falls, Physician and Surgeon.
- Barrett, Joseph F., '75, 84 Broad St., New York City, Salesman, Bowker Fertilizer Co.
- Barri, John A., '75, Water St. and Fairfield Ave., Bridgeport, Conn., Chittenden, Barri & Sanderson, National Fertilizer Co.
- Bassett, Andrew L., '71, New York City, Clerk, Vermont C. R. R. & Steamship Co.
- Beach, Charles E., '82, care Beach & Co., Hartford, Conn., Farmer.
- Bell, Burleigh C., '72, 16th and Howard Sts., San Francisco, Cal., Drug-gist and Chemist.
- Bellamy, John, '76, 659 Washington St., Boston, Nichols, Bellamy & Co., Hardware and Cutlery.
- Benedict, John M., '74, Commercial Block, Bank St., Waterbury, Conn., Physician.
- Benson, David H., '77, North Weymouth, Analytical and Consulting Chemist and Superintendent of Chemical Works, Bradley Fertilizer Co.
- Bingham, Eugene P., '82, 13 Foster Wharf, Boston, Bingham & Bennison, Makers of Embalming and Disinfecting Fluids.
- Birnie, William P., '71, Springfield, Salesman, Birnie Paper Co.
- Bishop, Edgar A., '83, Diamond Hill, R. I., Farmer.
- Bishop, William H., '82, Tongaloo, Miss., Superintendent of Industrial Department, Tongaloo University.
- Blanchard, William H., '74, Westminster, Vt., Farm Laborer.
- Boutwell, Willie L., '78, Leverett, Farmer.
- Bowker, William H., '71, 43 Chatham St., Boston, President Bowker Fertilizer Co.
- Bowman, Charles A., '81, Brookline, Civil Engineer.
- Boynton, Charles E., '81, Groveland, Lecturer.
- Bragg, Everett B., '75, Glidden & Curtis, Tremont Bank Building, Boston, Chemist.
- Braune, Domingos H., '83, Nova Friburgo, Province of Rio de Janeiro Brazil, Planter.
- Brett, William F., '72, Brockton, Clerk, R. H. White & Co., 518 Washington St., Boston.
- Brewer, Charles, '77, Orange, Florist.
- Brigham, Arthur A., '78, Marlborough, Farmer.
- Brodt, Harry S., '82, Frankfort, N. Y., Surveying, North River Construction Co., N. Y. West Shore & Buffalo R. R.
- Brooks, William P., '75, Sapporo, Japan, Professor of Agriculture, Japan Agricultural College.
- Bunker, Madison, '75, Newton, Veterinary Surgeon.
- Callender, Thomas R., '75, Everett, Florist.

- Campbell, Frederick G., '75, West Westminster, Vt., Farmer.
- Carr, Walter F., '81, Boston, Student, Massachusetts Institute of Technology.
- Caswell, Lilley B., '71, Athol, Civil Engineer and Farmer.
- Chandler, Edward P., '74, Andersonville, Montana, Cattle Raiser.
- Chandler, Everett S., '82, 20 Orchard St., North Cambridge, Student, Harvard Law School.
- Chapin, Henry E., '81, Chicago, Ills., "Farmers' Review," Journalist.
- Chickering, Darius O., '76, Enfield, Farmer.
- Choate, Edward C., '78, Southborough, Farmer.
- Clark, Atherton, '77, 131 Tremont St., Boston, Clerk.
- Clark, John W., '72, Amherst, Farm Superintendent, Agricultural College, and Assistant Professor of Agriculture.
- Clark, Xenos, Y., '78, P. O. Box, 1151, Boston, Scientist.
- *Clay, Jabez W., '75.
- Coburn, Charles F., '78, Lowell, Teller, Five Cents Savings Bank, and Editor "Daily Citizen."
- Cooper, James W., jr., '82, East Bridgewater, Drug Clerk.
- Cowles, Frank C., '72, City Engineer's Office, Worcester, Civil Engineer.
- Cowles, Homer L., '71, Amherst, Farmer.
- †Curtis, Wolfred F., '74.
- Cutter, John A., '82, 213 West Thirty-fourth St., New York City, Student at Albany Medical College.
- Cutter, John C., '72, Sapporo, Japan, Consulting Physician Sapporo Ken Hospital and Professor of Physical and Comparative Anatomy, Imperial College of Agriculture.
- Damon, Samuel C., '82, Lancaster, Farmer.
- Deuel, Charles F., '76, Amherst, Druggist.
- Dickinson, Richard S., '79, Columbus, Neb., Farmer.
- Dodge, George R., '75, Brighton, Superintendent of Factory, Bowker Fertilizer Co.
- Dyer, Edward N., '72, Kohala, S. I., Pastor Native Church.
- Easterbrook, Isaac H., '72, Diamond Hill, R. I., Farmer.
- Eldred, Frederick C., '73, 128 Chambers St., New York City, New York Manager of Montpelier Carriage Co.
- Ellsworth, Emory A., '71, 164 High St., Holyoke, Architect and Mechanical and Civil Engineer.
- Fairfield, Frank H., '81, 30 Kilby St., Boston, Standard Fertilizer Co., Chemist.
- Fisher, Jabez F., '71, Fitchburg, Freight Cashier, Fitchburg R. R. Co.
- Fiske, Edward R., '72, 625 Chestnut St., Philadelphia, Pa., Folwell Bro. & Co., Merchant.
- Flagg, Charles O., '72, Diamond Hill, R. I., Farmer.
- Flint, Charles L., jun., '81, 29 Newbury St., Boston, no business.
- †Floyd, Charles W., '82.
- Foot, Sanford D., '78, Paterson, N. J., Kearney & Foot, File Manufacturers.

* Died Oct. 1, 1880, of pneumonia, at New York City.

† Died Nov. 8, 1878, of inflammation of the brain, at Westminster.

‡ Died Oct. 10, 1883, of consumption, at Boston.

Fowler, Alvan L., '80, Tombstone, Arizona, Superintendent Woronoco Mining Co.

Fuller, George E., '71.

Gladwin, Frederic E., '80, Tombstone, Arizona, Assayer Woronoco Mining Co.

Goodale, David, '82, Marlborough, Farmer.

Green, Samuel B., '79, Mountainville, Orange Co., N. Y., Superintendent Horticultural Department, Houghton Farm.

Grover, Richard B., '72, Ludlow, Vt., Clergyman.

Guild, George W. M., '76, 17 & 19 Cornhill, Boston, Wire business.

Hague, Henry, '75, South Worcester, Rector St. Mathews.

Hall, Josiah N., '78, Sterling, Weld Co., Col., Physician.

Harwood, Peter M., '75, Barre, Farmer.

Hashiguchi, Boonzo, '81, Department of Commerce and Agriculture, Tokio, Japan, President Government Sugar Beet Co.

*Hawley, Frank W., '71.

Hawley, Joseph M., '76, Berlin, Wis., C. A. Mather & Co., Banker.

†Herrick, Frederick St. C., '71.

Hevia, Alfred A., '83, 13 Fifth St., Brooklyn E. D., N. Y., with "Universe Subscription Agency," 150 Nassau St., New York City.

Hibbard, Joseph R., '77, Stoughton, Wis., Farmer.

Hillman, Charles D., '82, Fresno City, Cal., Nurseryman.

Hills, Joseph L., '81, Amherst, Post-Graduate, Agricultural College.

Hitchcock, Daniel G., '74, Warren, Agent, American Express Co.

Hobbs, John A., '74, Bloomington, Neb., Farmer.

Holman, Samuel M., jun., '83, Attleborough, Student, Harvard Medical School.

Holmes, Lemuel Le B., '72, Mattapoisett, Lawyer.

Howard, Joseph H., '82, Springfield, Meter Inspector, Springfield Gas-Light Co.

Howe, Charles S., '78, Akron, Ohio, Buchtel College, Adjunct Professor of Mathematics.

Howe, Elmer D., '81, Marlborough, Farmer.

Howe, George D., '82, North Hadley, C. D. Dickinson & Son, Clerk.

Howe, Waldo V., '77, Framingham, Agent, Framingham Brick Co.

Hubbard, Henry F., '78, 94 Front Street, New York City, with John H. Catherwood & Co.

Hunt, John F., '78, Belmont, Civil Engineer.

Kendall, Hiram, '76, Providence, R. I., Superintendent and Chemist, Kendall Manufacturing Co.

Kimball, Francis E., '72, 15 Union Street, Worcester, Book-keeper, E. W. Vaill.

Kingman, Morris B., '82, Amherst, Post-Graduate, Agricultural College.

Kinney, Burton A., '82, United States Signal Service, Fort Myer, Va.

Knapp, Walter H., '75, Wellesley Hills, Florist.

Koch, Henry G. H., '78, Sixth Avenue and Twentieth Street, New York City, H. C. F. Koch & Son.

* Died Oct. 28, 1883, of congestive apoplexy, at Belchertown.

† Died Jan. 19, 1884, at Methuen.

- Ladd, Thomas H., '76, care Wm. Dadmun, Watertown, no business.
Lee, Lauren K., '75, Valley Springs, Dak., Superintendent of Seed Farm
for Kellogg & McDougall, Buffalo Linseed Oil Works.
Lee, William G., '80, Rock Point, Jackson Co., Oregon, Surveyor for
Railroad.
Leland, Walter S., '73, Concord, Officer State Prison.
Leonard, George, '71, Springfield, Lawyer.
Libby, Edgar H., '74, Rochester, N. Y., Journalist and Agricultural
Specialist, Farm and Garden Department of Hiram Sibley & Co.,
Seedsmen.
Lindsey, Joseph B., '83, Amherst, Assistant Chemist, Experiment Sta-
tion.
Livermore, Russell W., '72. Pates Robeson Co., North Carolina, Lawyer.
Lovell, Charles O., '78, Amherst, Photographer.
Lyman, Asahel H., '73, Manistee, Mich., Druggist and Bookseller.
Lyman, Charles E., '78, Middlefield, Conn., Farmer.
*Lyman, Henry, '74.
Lyman, Robert W., '71, Belchertown, Lawyer and Lecturer Mass. Agri-
cultural College.
Mackie, George, '72, Attleborough, Physician.
Macleod, William A., '76, 60 Devonshire Street, Boston, Patent
Lawyer.
Mann, George H., '76, Sharon, Superintendent of Cotton Duck Mills.
Martin, William E., '76, Excelsior, Minn., Postmaster.
May, Frederick G., '82, Orlando (P. O. Box 192), Orange Co., Fla.,
Farmer.
Maynard, Samuel T., '72, Amherst, Massachusetts Agricultural College,
Professor of Botany and Horticulture.
McConnel, Charles W., '76, 100 State Street, Albany, Dentist.
McQueen, Charles M., '80, First National Bank Building, Dearborn and
Monroe Streets, Chicago, Ill., Standard Book Co., Treasurer.
Miles, George M., '75, Miles City, Montana, Miles & Strevell, Jobbers of
Hardware.
Mills, George W., '73, Medford, Physician.
Minor, John B., '73, New Britain, Conn., Russell & Erwin Manufacturing
Co., Clerk.
Minott, Charles W., '83, 2 Washington Square, Worcester, with W. H.
Earle, Agricultural Warehouse and Seed Store.
Montague, Arthur H., '74, South Hadley, Farmer.
Morey, Herbert E., '72, 49 Haverhill Street, Boston, Morey, Smith & Co.,
Merchant.
†Morse, James H., '71.
Morse, William A., '82, 19 Milk Street, Boston, with Denison Manufac-
turing Co.
Myrick, Herbert, '82, Springfield, Assistant Editor "New England
Homestead."
Myrick, Lockwood, '78, Boston, Pacific Guano Co., Chemist.

* Died Jan. 8, 1879, of pneumonia, at Middlefield, Conn.

† Died June 21, 1883, of Bright's disease, at Salem.

- Nichols, Lewis A., '71, San Diequito, Mexico, via Laredo & Monteray,
care Sr. Don Pedro del Hoyo, San Luis Potosi, Mexico, Civil En-
gineer.
- Norcross, Arthur D., '71, Monson, Postmaster.
- Nourse, David O., '83, Amherst, employed in Feeding Department,
Experiment Station.
- Nye, George E., '77, 70 Exchange Building, Union Stock Yards, Chicago,
Ill., G. F. Swift & Co., Book-keeper.
- Osgood, Frederick H., '78, Springfield, Veterinary Surgeon.
- Otis, Harry P., '75, Leeds, Superintendent, Northampton Emery Wheel
Company.
- Page, Joel B., '71, Conway, Farmer.
- Paige, James B., '82, Prescott, F. B. Paige & Son, Mellen Valley Fruit
Farm.
- Parker, George A., '76, Tunis Mills, Talbot Co., Md., Superintendent,
"Fairview Farm."
- Parker, George L., '76, Dorchester, Florist.
- Parker, Henry F., '77, 5 Beekman Street and 182 Centre Street, New
York City, Mechanical Engineer.
- Parker, William C., '80, Wakefield, Farmer.
- Peabody, William R., '72, Atchison, Kans., General Agent, Atchison, To-
peka & Santa Fé Railroad.
- Penhallow, David P., '73, Montreal, Canada, McGill University, Professor
of Botany.
- Perkins, Dana E., '82, care C. M. Winchell, U. S. Survey Boat Tennessee,
Mississippi River Commission.
- Peters, Austin, '81, care Peters & Parkinson, Boston, Student, Harvard
Medical School.
- Phelps, Charles H., '76, South Framingham, Florist.
- Phelps, Henry L., '74, Northampton, Dealer in Fertilizers.
- Plumb, Charles S., '82, 34 Park Row, New York City, Associate Editor
"Rural New Yorker."
- Porter, William H., '76, Watertown, Foreman S. R. Payson's farm.
- Porto, Raymundo M. da S., '77, Para, Brazil, Planter.
- Potter, William S., '76, Lafayette, Ind., Rice & Potter, Lawyer.
- Preston, Charles H., '83, Amherst, Assistant Chemist, Experiment Station.
- Rawson, Edward B., '81, Brockport, Elk Co., Penn., N. Y. L. E. & W. R.
R. Co., Civil Engineer.
- Renshaw, James B., '73, Spokane Falls, Washington Territory, Clergy-
man.
- Rice, Frank H., '75, Hawthorne, Nev., County Recorder and *ex officio*
Auditor of Esmeralda Co.
- Richmond, Samuel H., '71, Ocala, Marion Co., Fla., Magistrate and
Deputy Clerk of Circuit Court.
- Ripley, George A., '80, 5 Franklin St., Worcester.
- Root, Joseph E., '76, Hartford, Conn., Retreat for Insane, Assistant Phy-
sician.
- Rudolph, Charles, '79, Mitchell, Dak., Lawyer.
- Russell, William D., '71, Turner's Falls, Montague Paper Co.

- Salisbury, Frank B., '72, Kimberley Diamond Fields, South Africa, Trader.
- Sears, John M., '76, Ashfield, Farmer.
- Shaw, Elliot D., '72, Holyoke, Florist.
- Sherman, Walter A., '79, 182 Central Street, Lowell, Veterinary Surgeon.
- Shiverick, Asa F., '82, Wood's Holl, Pacific Guano Co., Chemist.
- Simpson, Henry B., '73, Centreville, Md., Farmer.
- Smead, Edwin, '71, 3 Cable St., Baltimore, Md., Clerk, Bushey, Carr & Co., Flour and Grain Commission Merchants.
- Smith, Frank S., '74, Hampden, Woolen Manufacturer.
- Smith, George P., '79, Sunderland, Farmer.
- Smith, Hiram F. M., '81, 42 Austin St., Cambridgeport, Student, Harvard Medical School.
- Smith, Thomas E., '76, West Chesterfield, Manufacturer.
- Snow, George H., '72, Leominster, Farmer.
- Somers, Frederick M., '72, 49 Broadway, New York City, Watson & Gibson, Brokers.
- * Southmayd, John E., '77.
- Southwick, Andre A., '75, Care Beach & Co., Hartford, Conn., Superintendent "Vine Hill and Ridge Farms."
- Spalding, Abel W., '81, 907 North Main St., St. Louis, Mo., Ripley & Kimball, Clerk.
- Sparrow, Lewis A., '71, 19 South Market St., Boston, Judson & Sparrow, Dealers in Fertilizers.
- Spofford, Amos L., '78, Georgetown, Shoe-cutter.
- Stockbridge, Horace E., '78, Assistant Professor of Chemistry, elect, Massachusetts Agricultural College.
- Stone, Almon H., '80, Phillipston, Farmer.
- Stone, Winthrop E., '82, Mountainville, Orange Co., N Y., Experiment Department, Houghton Farm.
- Strickland, George P., '71, Stillwater, Minn., Seymour, Sabin & Co., Machinist.
- Swan, Roscoe W., '79, 32 Pleasant St., Worcester, Physician.
- Taft, Cyrus A., '76, Whitinsville, Machinist.
- Taft, Levi R., '82, Amherst, Bursar and Assistant Professor Horticulture, Agricultural College.
- Taylor, Alfred H., '82, Red Oak, Ia., Stock-raiser.
- Taylor, Frederick P., '81, Athens, East Tenn., Farmer.
- Thompson, Edgar E., '71, East Weymouth, Teacher.
- Thompson, Samuel C., '72, New York City, Department Public Works, Annexed District, Assistant Engineer.
- Thurston, Wilbur H., '82, Upton, Farmer.
- Tucker, George H., '71, Fargo, Dak., Civil Engineer,
- Tuckerman, Frederick, '78, Amherst, Physician and Lecturer, Agricultural College.
- Urner, George P., '76, Sweet Grass, Montana, Sheep-raiser.
- Wakefield, Albert T., '73, Peoria, Ill., Physician.
- Waldron, Hiram E. B., '79, North Rochester, Farmer.

* Died December 11, 1878, of consumption, at Minneapolis, Minn.

- Ware, Willard C., '71, 255 Middle St., Portland, Me., Manager Boston & Portland Clothing Co.
- Warner, Clarence D., '81, Baltimore, Md., Student, Johns Hopkins University.
- Warner, Seth S., '73, 43 Chatham St., Boston, Travelling Salesman, Bowker Fertilizer Co.
- Washburn, John H., '78, Mansfield, Conn., Professor of General and Agricultural Chemistry, Storrs Agricultural School.
- Webb, James H., '73, 81 Church St., New Haven, Conn., Clark, Swan & Webb, Attorneys and Counsellors at Law.
- Wellington, Charles, '73, Germany, Student.
- Wells, Henry, '72, 105 North 3d St., St. Louis, Mo., Contracting Agent West-bound Freight, "Blue Line," Fast Freight Office.
- Wetmore, Howard G., '76, 41 West 9th St., New York City, Physician.
- Wheeler, Homer J., '83, Amherst, Assistant Chemist, Experiment Station.
- Wheeler, William, '71, 70 Kilby St., Boston, President, Wheeler Reflector Co.
- Whitney, Frank Le P., '71, 280 Westminster St., Providence, R. I., F. L. Whitney & C. H. Kimball, Dealers in Oil Stoves and Kerosene Fixtures.
- Whitney, William C., '72, Minneapolis, Minn., Architect.
- Whittaker, Arthur, '81, Needham, Farmer.
- Wileox, Henry H., '81, Nawiliwili, S. I., Sugar Industry.
- Wilder, John E., '82, 179 Lake St., Chicago, Ill., Wilder & Hale, Dealers in Leather.
- Williams, James S., '82, North Glastonbury, Conn., Farmer.
- Williams, John E., '76, Amherst, Editor "Record."
- Winchester, John F., '75, Lawrence, Veterinary Surgeon and Lecturer, Massachusetts Agricultural College.
- Windsor, Joseph L., '82, St. Paul, Minn., Office North Pacific R. R. Co., Stenographer.
- Wood, Frank W., '73.
- Woodbury, Rufus P., '78, Kansas City, Mo., News and Telegraph Editor of "Kansas City Daily Times."
- Woodman, Edward E., '74, Danvers, E. & C. Woodman, Florists.
- Wyman, Joseph, '77, Cambridgeport, Book-keeper at 52 to 60 Blackstone St., Boston.
- Zeller, Harrie McK., '74, Hagerstown, Md., Baltimore & Ohio Telegraph Co., Manager of Commercial Office.

COURSE OF STUDY AND TRAINING.

FRESHMAN YEAR.

<i>Scientific and Literary.</i>	<i>Scientific and Agricultural.</i>
<i>1st Term.</i> — Algebra.	<i>1st Term.</i> — Algebra.
Botany.	Botany.
French.	Agriculture.
<i>2d Term.</i> — Geometry.	<i>2d Term.</i> — Geometry.
History.	History.
Botany.	Botany.
Lessons in Language.	Lessons in Language.
Free-Hand Drawing.	Free-Hand Drawing.
French.	Agriculture.
<i>3d Term.</i> — Geometry.	<i>3d Term.</i> — Geometry.
Botany.	Botany.
French.	Agriculture.

SOPHOMORE YEAR.

<i>1st Term.</i> — Geometry and Trigonometry.	<i>1st Term.</i> — Geometry and Trigonometry.
Botany.	Botany.
Chemistry.	Chemistry.
German.	Agriculture.
<i>2d Term.</i> — Trigonometry.	<i>2d Term.</i> — Trigonometry.
Chemistry.	Chemistry.
Physiology.	Physiology.
Mechanical Drawing.	Mechanical Drawing.
German.	Agriculture.
<i>3d Term.</i> — Surveying.	<i>3d Term.</i> — Surveying;
Botany.	Botany
Zoology.	Zoology.
German.	Agriculture. Horticulture and Market Gardening.

JUNIOR YEAR.

<i>1st Term.</i> — Mechanics. English Literature. Constitutional History.	<i>1st Term.</i> — Mechanics. English Literature. $\left\{ \begin{array}{l} \text{Agriculture.} \\ \text{Entomology.} \end{array} \right.$
<i>2d Term.</i> — Physics. English Literature. Chemistry. Latin	<i>2d Term.</i> — Physics. English Literature. Chemistry. $\left\{ \begin{array}{l} \text{Agricultural Debate.} \\ \text{Arboriculture and} \\ \text{Care of Nurseries.} \end{array} \right.$
<i>3d Term.</i> — Physics. Chemistry. Latin.	<i>3d Term.</i> — Physics. Chemistry. Roads and Railroads.

SENIOR YEAR.

<i>1st Term.</i> — Book-keeping. Chemistry. Mental Science. Mineralogy.	<i>1st Term.</i> — Book-keeping. Chemistry. Mental Science. Agriculture.
<i>2d Term.</i> — Organic Chemistry. Political Economy. Microscopy.	<i>2d Term.</i> — Organic Chemistry. Political Economy. Agriculture.
<i>3d Term.</i> — Moral Science. Geology. History of Philosophy.	<i>3d Term.</i> — Moral Science. Geology. Agriculture.

In all studies, students are to be trained to accurate and ready oral and written expression, and to use drawing as language. Military tactics and military drill, as ordered throughout the course. Weekly exercises in compositions and declamations throughout the course. The instruction in agriculture and horticulture is both theoretical and practical. Instruction in the field and manual training is given whenever such instruction and training will conduce to the progress of the student. Students are allowed to work for wages during such leisure hours as are at their command. A limited amount of work has been found to be beneficial, but work that withdraws the energy of the student from his studies is unprofitable to him. Students sometimes earn from fifty to one hundred dollars per annum. Those who complete the course receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the college may also, on application, become members of Boston University, and, upon graduation, receive its

diplomas in addition to that of the college, thereby becoming entitled to all the privileges of its alumni.

LECTURES.

In addition to the instruction given by the resident instructors, gentlemen eminent in their several vocations give lectures on subjects of practical value to the students. Among those who have favored us or are to favor us with lectures during the present college year are: Hon. Levi Stockbridge, Amherst; Col. J. E. Russell, Secretary of Board of Agriculture; Hon. J. S. Grinnell, Greenfield; Major H. E. Alvord, Houghton Farm, Orange Co., N.Y.; B. P. Ware, Esq., Marblehead; Dr. J. R. Nichols, Haverhill; Rev. G. S. Dickerman, Amherst. All interested in the lectures given at the college, or in any other general exercises, are cordially invited to be present.

ADMISSION.

Candidates for admission to the Freshman Class are examined orally and in writing, upon the following subjects: English Grammar, Geography, Arithmetic, Algebra through simple equations, and the History of the United States.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the college until he is fifteen years of age. Every applicant is required to furnish a certificate of good character from his late pastor or teacher. Candidates are requested to furnish the Examining Committee with their standing in the schools they have last attended. The previous rank of the candidate will be considered in admitting him. Tuition and room-rent must be paid in advance at the beginning of each term.

EXPENSES.

Tuition,	.	.	.	.	.	.	.	\$12 00 per term.
Room-rent,	.	.	.	.	.	.	.	\$5 00 to 10 00 per term.
*Board,	.	.	.	.	.	.	.	3 00 to 5 00 per week.

* At the time of issuing this report, board was furnished at the State boarding house at \$3.25 per week, payable in advance, at the beginning of each term.

Expenses of chemical laboratory to students of practical chemistry,	\$10 00 per term.
Furniture,	15 00 to 50 00
Uniform for the four years course,	30 00
Public and private damages, including value of chemical apparatus destroyed or injured,	At cost.
Annual expenses, including books,	\$250 00 to 350 00

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given: In the south dormitory the main corner rooms are fifteen by eighteen feet, and the adjoining bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

SCHOLARSHIPS.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

The trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter college with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture. To every such student the cash value of a scholarship is one hundred and forty-four dollars.

The legislature of 1883 passed the following Resolve in favor of the Massachusetts Agricultural College:—

Resolved, That there shall be paid annually, for the term of four years, from the treasury of the Commonwealth to the treasurer of the Massachusetts Agricultural College, the sum of ten thousand dollars, to enable

the trustees of said college to provide for the students of said institution, the theoretical and practical education required by its charter and the law of the United States relating thereto.

Resolved, That annually for the term of four years, eighty free scholarships be and hereby are established at the Massachusetts Agricultural College, the same to be given by appointment to persons in this Commonwealth, after a competitive examination, under rules prescribed by the president of the college, at such time and place, as the senator then in office from each district shall designate; and the said scholarships shall be assigned equally to each senatorial district; but if there shall be less than two successful applicants for scholarships from any senatorial district, such scholarships may be distributed by the president of the college equally among the other districts, as nearly as possible, but no applicant shall be entitled to a scholarship unless he shall pass an examination in accordance with the rules to be established as herein before provided.

In accordance with these resolves, any one desiring admission to the college can apply to the senator of his district for a scholarship.

RELIGIOUS SERVICES.

Prayers in chapel every morning at a quarter after eight o'clock. On Sundays the students, unless excused by request of their parents to attend church elsewhere, attend service in the chapel. This service is conducted by the president or such clergyman as he invites. The students are also invited to join a class for the study of the Bible.

The Young Men's Christian Association holds weekly meetings.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the college or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the Faculty in their respective departments.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The library of the college contains at present about three thousand volumes. The income of the fund raised by the alumni and others is devoted to its increase, and additions are made from time to time, as the needs of the several departments require.

The State cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the college, and is of much value for purposes of instruction. It has recently received valuable additions of several thousand specimens of minerals, fossils, shells, insects and birds' eggs and nests.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About fifteen hundred species and varieties of plants are cultivated in the Durfee Plant House, affording the student an invaluable opportunity of studying the most important types of the vegetable kingdom in their scientific and economic relations.

The class in microscopy has the use of Tolles's best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

PRIZES.

FARNSWORTH RHETORICAL MEDALS.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, the income of which is to be used as prizes, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Clafin of Boston has given the sum of one thousand dollars for the endowment of a first prize of fifty dollars, and a second prize of thirty dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILL'S BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1884, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

CONDUCT.

Students are expected to co-operate with their instructors and with each other in promoting the welfare of the college, in order that every student may receive the best possible results of the course of study and training. Whenever it is evident that it is not for the good of a student to remain in the college, or that the welfare of the college requires that he should not remain, he will be dismissed.

LOCATION.

Amherst is on the New London & Northern R.R., connecting at Palmer with the Boston & Albany R.R., and at Miller's Falls with the Fitchburg R.R. A stage route of seven miles connects Amherst at Northampton with the Connecticut River R.R., and with the New Haven & Northampton R.R. The college buildings are on a healthful site commanding one of the finest views in New England. The large farm of three hundred and eighty-three acres with its varied surface and native forests gives the student the freedom and the quiet of a country home. The surrounding country is very helpful to the student of natural science. The location of the buildings prevents the student from the interruptions to study, incident on residence in a town or city, and helps to secure all the moral as well as the intellectual advantages of a college in the country.

STATEMENT

OF CASH RECEIPTS AND EXPENSES OF MASSACHUSETTS AGRICULTURAL COLLEGE FOR YEAR ENDING JAN. 1ST, 1884.

	Receipts.	Payments.
Cash on hand Jan. 1st, 1883,	\$738 59	-
Term Bill Account,	4,361 53	\$1,339 19
Botanic Account,	5,104 44	6,637 77
Farm Account,	2,711 40	3,829 89
Boarding House Account,	1,938 07	1,917 43
President's House,	-	2,082 85
Laboratory Account,	54 82	673 92
Hills Fund,	-	89 18
Expense Account,	305 87	4,939 87
John Cummings, <i>Treasurer</i> ,	19,974 36	-
Plant House Cons. Account,	-	2,634 52
Drill Hall Cons. Account,	-	1,877 76
Grinnell Fund,	-	80 00
Farnsworth Fund,	-	65 30
Salary Account,	-	8,502 92
Cash on hand Jan. 1st, 1884,	-	318 48
	\$34,989 08	\$34,989 08

LEVI R. TAFT,

Bursar.

AMHERST, MASS., Jan. 1, 1884.

HOUSE.

No. 17.

TWENTY-SECOND ANNUAL REPORT

AND

CATALOGUE

OF THE

*Massachusetts Agricultural
College.*

JANUARY, 1885.

BOSTON:

WRIGHT & POTTER PRINTING CO., STATE PRINTERS,

18 POST OFFICE SQUARE.

1885.

HOUSE.

No. 17.

TWENTY-SECOND ANNUAL REPORT

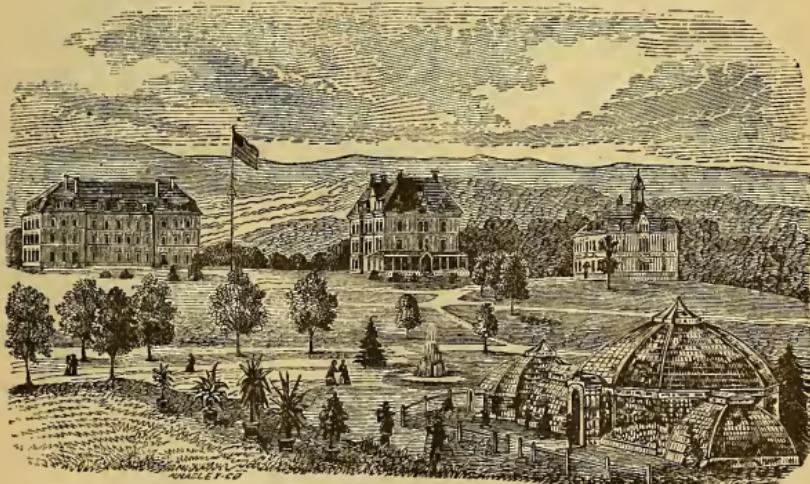
AND

CATALOGUE

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

JANUARY, 1885.

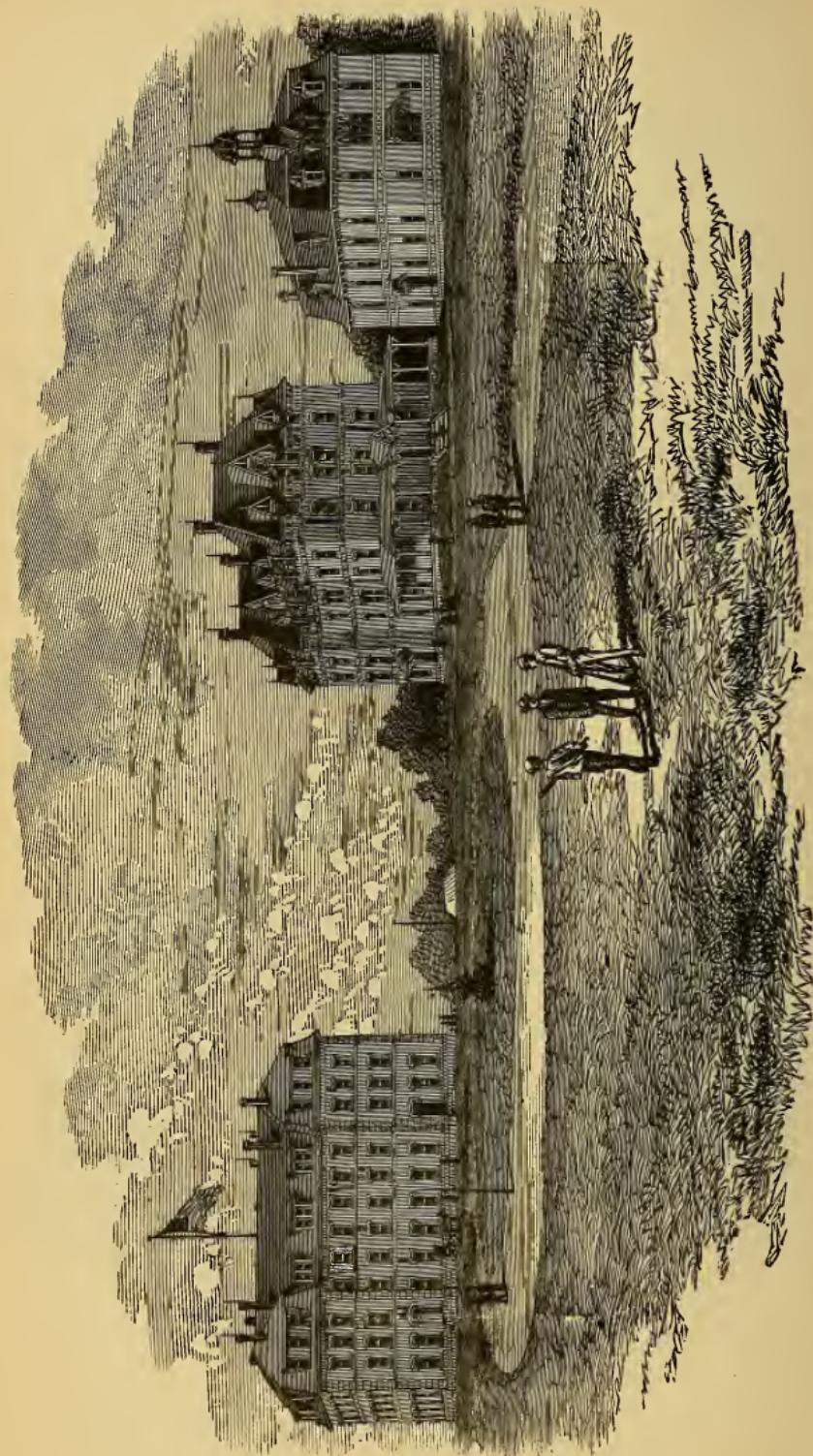


BOSTON:

WRIGHT & POTTER PRINTING CO., STATE PRINTERS,

18 POST OFFICE SQUARE.

1885.



Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT,
BOSTON, Jan. 20, 1885.

To the Honorable Senate and House of Representatives :

I herewith transmit to you in writing the twenty-second annual report and catalogue of the Massachusetts Agricultural College, and respectfully invite your consideration of the same.

GEO. D. ROBINSON,
Governor.

Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Jan. 18, 1885.

To His Excellency GEO. D. ROBINSON:

SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Twenty-second Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,

Your obedient servant,

JAMES C. GREENOUGH,
President.

CONTENTS.

	PAGE
REPORT OF TRUSTEES,	9
Introductory,	9
Buildings,	9
The Farm,	12
Course of Study,	13
Attendance,	14
Immediate Needs of the College,	15
Gifts to the College,	16
Department of Practical Agriculture,	17
Botanical Department,	19
Chemical Department,	21
Department of Anatomy and Physiology,	23
Mathematical Department,	25
Military Department,	27
Treasurer's Report,	59
CATALOGUE AND CIRCULAR,	33
Faculty and Undergraduates,	35
Catalogue of Graduates and Employments,	41
Course of Study, etc.,	49

ANNUAL REPORT

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

To His Excellency the Governor and the Honorable Council:

The last year has been, in many ways, a successful year to the college. The standard of scholarship has been raised, the course of study has been extended, buildings and grounds have been improved, new buildings have been erected, an excellent class of young men has been in attendance, and good health, good cheer and a determination to accomplish good results, have characterized those in charge of the practical work of the several departments, the students and the faculty.

BUILDINGS.

The appropriation of \$6,000, made by the last legislature for the repair and improvement of North College and "other buildings of the college," was very timely, and, under the direction of the building committee of the trustees, O. B. Hadwen, Esq., of Worcester, J. H. Demond, Esq., of Northampton, President Greenough, and Hon. Daniel Needham of Groton, the money has been carefully expended. Throughout the first three stories, with the exception of two rooms previously repaired,—one occupied by the Christian Union, the other by one of the literary societies of the college,—the entire wood-work has been removed, and new wood-work substituted. This, well

finished and covered with oil and shellac, has a very neat and cheerful appearance. In the fourth story, the rooms were most thoroughly repaired and painted, with the exception of three rooms previously fitted up. New floors have been put down throughout the building wherever needed. Twelve new windows have been added, thus securing ample light to all the rooms in the first three stories. The original treatment of the roof rendered it impracticable to add windows to the inner rooms of the upper story; but the position of these rooms makes additional light less needful than for those in the lower stories. Two rooms on the first floor of this building have been arranged for the present as library rooms. The roof of the boarding-hall has been shingled and the rear annex covered with tin. The dining-room has been reconstructed, and other improvements have been made in the building and in the drainage. We have also provided a much needed barn for the botanic department. The appropriation made to complete the house to be occupied by the president has been expended for that purpose, and the house is now occupied by him.

The library and chapel building, for the erection of which twenty-five thousand dollars was appropriated, is in a fair way to be completed on or before the first of July next. The walls are for the most part finished, and the roof is being put on. To make provision for what is required in this building, and to build of stone or brick according to the act making the appropriation, and still to keep within the limits of the appropriation, we have found a difficult task. After several meetings of the building committee, the architect and contractors, a contract for the erection of the building was made with John Beston of Amherst, a builder of large experience and excellent reputation. Stephen C. Earle, of Worcester, is the architect. While we expect to be able to put up the main part of the building and complete it, within the appropriation, we find ourselves obliged to omit most of the tower. With our present means we shall be compelled to finish the tower with a roof after it reaches a sufficient height to form an entrance. The group of college buildings, as well as this building, requires this tower. No one visiting the grounds will be satisfied with this library

and chapel building in the imperfect state in which we are now obliged to leave it. The design of the architect should be carried out, that we may have a place for the college bell and for the college clock. The evident determination of one of the classes now in college to provide an excellent clock, if the tower is now built, and the fact that the building can now be perfected at less expense than hereafter, are important arguments for finishing the building as designed. We could not make the building smaller and have it suffice for the purposes intended ; hence our effort to keep within the appropriation and secure the rooms needed, though unable to perfect the building. An appropriation will be needed at an early day to furnish this building, and to do what is needful to perfect the building according to its plan. As soon as it is furnished with shelving and cases, our library and our more valuable geological and other specimens will be transferred to it. This building is of granite, from the Pelham quarry, belonging to the college. On the sixth of last November the corner-stone was laid. His Excellency Gov. Robinson, *ex-officio* President of the Board of Trustees, being unable to fulfil his intention to be present, Hon. J. S. Grinnell, of Greenfield, presided. The reasons for erecting the building were briefly outlined by President Greenough. He referred to the action of the alumni at their annual meeting in 1883, when measures were taken to provide a better library for the college,— to the request of the Board of Control for the use of the present chapel-room for a laboratory for the Massachusetts Experiment Station,— and to the evident needs of the college for all that is to be secured in the building.

Herbert Myrick, of Springfield, of the class of '82, spoke in behalf of the library committee of the alumni. Ex-President Stockbridge spoke of the progress and the aims of the college. Arthur A. Brigham, of the class of '78, and S. C. Damon, of the class of '82, also made pertinent addresses respecting the value and the prospects of the college. O. B. Hadwen, Esq., of Worcester, gave a detailed account of the plan of the building. Hon. C. L. Flint, of Boston, for a time president of the college, outlined its early history. The closing exercises were the singing of an original hymn

by the audience, led by the college choir, prayer by the Rev. Samuel Snelling, rector of Grace Church in Amherst, the putting of the corner-stone in place by the presidents of the several classes now in college, and the benediction by the rector.

THE FARM.

John W. Clark, Farm Superintendent and Instructor in Agriculture, resigned April 1, to accept a position in a neighboring State. We cherish an esteem for him as a man, and shall remember his efforts to promote the welfare of the college. Since April 1, the President has been acting superintendent. Mr. David A. Wright has the farm in his immediate charge, and to his faithful work and direction the successful management of the farm is largely due. The work on the farm has been done in good season, and well done. In addition to the usual work for the season, the fitting and seeding of the thirty acres of pasture land has been completed. This land is our best pasturage — 25 acres have been seeded to mowing, and now promise a large yield of grass for another year. Most of the land to be planted next year is ploughed and some of it is manured.

The approximate list of crops harvested is as follows : 70 tons of hay, 740 bushels of shelled corn, 142 bushels of wheat and oats, 35 tons of beets, 500 bushels of carrots, 1,500 bushels of turnips, and 300 bushels of potatoes.

The results of good farming are two : increase of profitable crops, and improvement of the soil. The land of the college farm should be rendered more productive. Unless the New England farmer tills thoroughly and keeps his land in a highly productive condition, he cannot successfully compete, at present prices for labor, with the new lands of the West. To bring the tillage and mowing of the college farm to a high state of fertility will require large expense if done in one year, but it may be gradually accomplished by rotation of crops, and by saving carefully and applying skilfully fertilizing material.

So far as the farm is used for instruction it cannot be expected to yield pecuniary profit.

COURSE OF STUDY.

The general plan and object of the course of study were fully explained in our report of last year. From the four years' course at this college, Greek is excluded. Provision is made for the teaching of Latin one year. Thus a larger proportion of the four years than can be given in the regular course of the older colleges, is given to the study of the English language, the modern languages, and the natural sciences. In this college, as in the older colleges, the upper classes give due attention to those studies that lead one to a knowledge of himself and of his relations to his fellow-men and to God. Mental philosophy, political economy, history, civil polity, with special reference to our own government, and moral philosophy, are now an important part of the course. The act in accordance with which the college was founded, requires the "support and maintenance" of a "college where the leading object shall be, without excluding scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." Hence in this college the sciences are to be taught in their relations to agriculture and in their applications to the mechanic arts. Military tactics, in accordance with the act founding the college, are also taught by a military officer, who is a graduate of West Point, and who, for the purpose of teaching, is detailed from the army of the United States. While the course thus tends to develop physical, intellectual and moral manhood, it has special relations to agriculture, furnishing special opportunities to those who wish to engage in horticulture, or in other departments of field work. There is no other institution in New England furnishing equal opportunities for practical instruction in the several departments of field and hot-house work.

A plain, substantial, but inexpensive building is needed for the agricultural department. This should be conveniently arranged for purposes of instruction, and with ample means

of illustrating what is taught. There should be gathered under its roof a museum of agricultural implements and of agricultural products. Some of the graduates of the college are now making collections for such a museum.

While, as custodians of property belonging to the State, we feel bound to keep the buildings of the college in good condition as far as our funds will permit; and while we are aware that the new buildings and the improvements in other buildings must contribute to the efficiency of the college, we recognize clearly that buildings are but one means of success, and that a more important means are the appliances for teaching put into the buildings. Hence when the new building is completed and the class-rooms are permanently assigned to the several departments, we propose to provide additional means of instruction. There should be a considerable outlay for additional apparatus in the Department of Physics. The practical work of the college requires much objective teaching. Such teaching is impossible without suitable apparatus. Long ago there should have been at this college an agricultural library, superior to any other within the limits of the State. The value of such a library to the students of the college and to all who wish to investigate agricultural and related scientific subjects is evident, and we confidently expect that when our new library building is finished the donations of books and of money for the purchase of books will be largely increased.

ATTENDANCE.

Though there has been during the year a decided advance in the scholarship required to maintain one's standing in the several classes, the number of students in attendance at the College has not diminished. If one considers the intellectual power, the habits of study, and the character of the students now in the College, he must have no little satisfaction in its condition. When the present attendance is increased from 30 to 40 per cent. we shall have as many students as our present arrangements will justify. A greater number cannot be well accommodated, and if they could, a large increase of teaching force would be required, owing to the division of classes. Both economy and thorough in-

struction require that our numbers shall not exceed the limits indicated. At the beginning of the present college year thirty were admitted to the Freshman class. Twenty-six of these received scholarships, in accordance with the resolve passed by the legislature of 1883. The members of the Senate of our State have shown commendable faithfulness in giving notice in their several districts and in arranging for examination of candidates. The State College meets the wants of those who desire a more thorough scientific and practical training than can be obtained at most of our higher institutions. Such students are usually obliged to make their own way in the world, and are compelled to practice rigid economy. The expenses of the course though very moderate as compared with many other colleges, are beyond the means of a large proportion of those in whose interest the college was established. Whatever can be reasonably done to diminish the expenses of the course, the Trustees are disposed to do. Arrangements are made to employ students at such times as will not interfere with their studies, so far as circumstances will allow. With the co-operation of Mr. Wright, the farmer, and his wife, some of the students have formed a club and furnished themselves with good board for about \$2.50 per week. I believe the State of Massachusetts, that in the past has done so much by direct gifts to other colleges and private institutions within the State to extend their usefulness, will not be slow to open the way to that increasing class of workingmen's sons who desire to avail themselves of the advantages of the State College, but who have not the means so to do.

IMMEDIATE NEEDS OF THE COLLEGE.

1. In the earlier part of this report we have noticed the condition of the Library and Chapel Building, and the course pursued by the Building Committee in its erection. An appropriation is now needed to put in heating apparatus, to furnish the library and reading-room, to provide cases for the State collections now in the care of the College, and to do what additional work may be necessary to complete the building according to its design.

2. The chemical laboratory building has been in almost

constant use for many years, both in term time and vacation. The floor of the laboratory is worn out, and other floors and walls require extensive repairs. The building in its interior needs a thorough renovating, and changes should be made that will better secure light and ventilation. It should be rendered more serviceable to the classes in chemistry. The appropriation for the erection of the Library and Chapel Building was made last year with the understanding that a part of the chemical laboratory building would be surrendered to the Experiment Station for its exclusive use as a laboratory. To make the changes needed, and to fit up this laboratory, it has been estimated that \$2,000 will be sufficient, but there are reasonable doubts whether this amount will prove sufficient.

GIFTS.

At the time of the laying of the corner-stone of the Library and Chapel Building a letter was read by Prof. Goodell, received from J. C. Cutter of the Class of '72, now Professor of Physiology and Comparative Anatomy, Imperial College of Agriculture, Sapporo, Japan, announcing a gift of one hundred dollars in gold, to be expended in the purchase of recent scientific works for our library. C. S. Plumb, Assistant Director in the Experiment Station of New York, of the Class of '82, has sent us gifts of agricultural products for our museum. Books have been received from George Tolman, Esq., of Boston. We wish to express our thanks to the above named gentlemen, and to others who have aided us by gifts.

DEPARTMENT OF PRACTICAL AGRICULTURE.

President JAMES C. GREENOUGH.

SIR : — The following report on the course of instruction in Practical Agriculture for the year 1884 is respectfully submitted :

Twenty-two of the Freshmen of last year, twenty of the present Sophomores and all of the Juniors and Seniors have taken the course in agriculture. The general plan of instruction in this department, as given in outline in my report of last year, has been followed in the class-room, so that all of the classes in agriculture are now in their regular place in the course.

From the interest manifested by the students in the several topics presented, the course of instruction for the year has been, on the whole, satisfactory, notwithstanding the serious disadvantages arising from the want of suitable facilities for illustration.

During the past term the senior class have had a course of lectures on biology in its relations to agriculture, illustrated by work and experiments with culture apparatus and the microscope, performed by the students themselves, which has not only served to train them in exact methods of investigation, but enabled them to make actual demonstrations of the practical applications of the principles taught.

The rapid development of biological science within the past few years, and the many direct applications of the latest discoveries in almost every department of practical agriculture seem to indicate that the course of instruction may be profitably extended in this direction.

It has been said that, "there is perhaps no department of science which so nearly concerns the wealth and well-being of the community," and it is safe to add that it is of paramount importance to the farmer from the fact that a large proportion of the problems of pecuniary interest, in the applications of science to practical agriculture, can only be solved by lines of inquiry in this newly developed science.

Satisfactory class work in this department can only be made with the aid of microscopes and other apparatus of the most perfect construction, and especially adapted to the purpose, and these are of course expensive.

An expenditure of from one thousand to fifteen hundred dollars can profitably be made, both in the interest of the students and the college, in providing the necessary apparatus for class instruction in this department.

In my report of last year, a suitable class-room, a work-room and an agricultural museum, were mentioned as among the most pressing wants of the department, and my experience in teaching the past year prompts me to give still greater emphasis to these defects in the means of instruction.

The present class-room for agriculture is the one not occupied at the time for other purposes, and I have given lectures in six different rooms within the year, without any opportunity for the use of diagrams or other essential means of illustration, as they would interfere with the legitimate use of the rooms by the department to which they were assigned.

If the Massachusetts Agricultural College is to occupy a leading position among the industrial colleges of the country, provision must be made to place agriculture on an equal footing, at least, with other departments in facilities for instruction and means of illustration.

MANLY MILES.

BOTANIC DEPARTMENT.

President J. C. GREENOUGH.

SIR :— I have the honor to submit the following report as to the condition of the Botanic Department. The instruction in the class-room and the field in this department has been given in accordance with the college curriculum. The change in the course of study, bringing the subjects of botany and horticulture into the summer and fall, is a step in the right direction, making the work much more interesting and easier for both student and teacher.

The students have shown unusual interest in their work, which has been especially manifest in the very fine herbaria completed at the close of the fall term.

The work of instruction has been somewhat impeded by the efforts to have all the recitations in the rooms in the main college buildings. This is undoubtedly desirable for the economy of the students' time; but the best results in teaching the *natural sciences* can only be obtained where the recitation rooms are closely connected with cabinets and specimens for illustrations.

The crops during the season have been very abundant and of very fine quality, so much so that the prices received for them, in many cases, have been below the cost of production.

The trees in the peach and pear orchard received, during the winter of 1884, a severe "heading in," and are very much improved in form. The peach trees thus treated, many of them indicated signs of "yellows," but the effect of this pruning, and the application of an abundance of bone and potash, has apparently restored them to complete health. About five hundred young peach trees were planted in May

on the slope east of the chestnut grove, and have made a very satisfactory growth.

Notwithstanding the very low prices of all garden produce, the income from the sales of the department is much larger than for the year of 1883.

FINANCIAL STATEMENT.

Dr.

To cash sales as follows:

Received from sales of flowers,	. . . . .	\$535 42
" " " plants,	. . . . .	1,077 28
" " " trees,	. . . . .	2,569 05
" " " fruit,	. . . . .	615 71
" " " vegetables,	. . . . .	1,113 03
" " " sundries,	. . . . .	1,098 99
Total cash sales,	. . . . .	\$7,009 48
To bills due at date,	. . . . .	\$1,188 24
" increase in produce on hand,	. . . . .	90 00
" " hay and grain,	. . . . .	100 00
" bills paid incurred previous to Jan. 1, 1884,	. . . . .	579 97
	—————	1,958 21
Total income,		\$8,967 69

Cr.

By cash paid out by treasurer,	. . . . .	\$7,804 73
" " " department,	. . . . .	28 84
" bills due Jan. 1, 1884,	. . . . .	350 65
" " unpaid to date,	. . . . .	250 00
	—————	8,434 22
Balance,		\$533 47

S. T. MAYNARD.

CHEMICAL DEPARTMENT.

President JAMES C. GREENOUGH.

SIR:—The course of instruction given during the past year, in the chemical department, has been in the main the same as the preceding year, with the exception that organic chemistry, with reference to its application in industry and agriculture, will be taught hereafter in the second senior term.

The Senior, Junior and Sophomore classes have taken part in the exercises. The Sophomore class has received instruction during two terms in the chemistry of non-metallic and metallic elements, with practical illustration of the best modes for their recognition. The Junior class has been engaged with practical chemical work in the laboratory, for two terms in succession. During the first term they have studied the characteristics of the common metallic elements, by ways of the blowpipe, and humid analysis. The second term has been occupied with learning the properties of the most important mineral acids and their principal combinations with metallic oxides.

The Senior class has devoted one term of laboratory work to the examination of prominent products of various branches of chemical industry, and of refuse material employed for manurial purposes, besides analyzing commercial fertilizers, soils and important minerals.

The composition and application of commercial fertilizers and of manurial matter in general, has been treated in this connection by a series of special lectures.

Aside from the regular class duties, considerable attention

has been given to chemical work in the laboratory, by advanced students and post-graduates.

The general mode of instruction in the chemical department consists of lectures with experimental illustrations, followed by recitations. The students are obliged to write out the principal points of the lectures, and are marked on both recitations and notes. The laboratory work is accompanied by a suitable series of discourses on the best modes of analysis, and their proper application. A record of the practical work carried on has to be presented to the teacher at stated times.

The entire course in theoretical and practical chemistry has been arranged to meet the aim of the College, *i. e.*, to prepare young men for a successful employment in the various chemical industries, and in agriculture in particular.

During the last term of the past year Professor H. E. Stockbridge has entered with much success upon his duties as Assistant Professor in Chemistry. The instruction, during the first term of the Sophomore year, above referred to, has been given by him.

I am, very respectfully, yours,

C. A. GOESSMANN.

AMHERST, DEC. 24, 1884.

ANATOMY AND PHYSIOLOGY.

President JAMES C. GREENOUGH.

SIR :— I have the honor to submit the following report :—

In this department the endeavor has been to present the subjects under consideration, in as clear and practical a manner as possible, and to attempt to cover only as much ground as could be profitably covered in the limited time at our disposal.

My idea has been that instruction in anatomy and physiology appropriate for a College course should embrace a thoroughly practical discussion of these subjects, carried on by means of lectures, recitations, frequent illustrations, and practical exercises.

The course, therefore, so far as possible, has been made to conform to this idea. Instruction has been given, chiefly by lectures, in Descriptive Anatomy, so far as is necessary for an intelligent understanding of physiology. This subject has been taught by means of a text-book and lectures. In addition to the above, considerable time has been devoted to the study of Histology, or Microscopic Anatomy ; and an effort was made, when considered practicable, to touch upon Physiological Chemistry. The study of the minute structure and composition of the various tissues and organs of the human body has often been neglected in College courses. Teaching is not only simplified, but is rendered far more interesting, by the frequent use of illustrations. For these reasons, skeletons, elastic models, fresh specimens, diagrams and charts, and microscopic sections, have been in constant use.

The average scholarship, and the interest manifested by the class, were very satisfactory.

The most urgent need of the department at present, is a set of standard works, for reference on the various subjects taught. This want has been met in part by the generous gift of Prof. John C. Cutter, of the Imperial College of Agriculture, Sapporo, Japan.

During the past term anthropometric observations were made, by Prof. Manly Miles and myself, upon over fifty students of the college, and as a result, nearly three thousand measurements were recorded. These statistics were taken partly with a view to their bearing upon the much-disputed question of Bilateral Asymmetry of Function. It was hoped that these statistics would be ready for publication in the present College report, but from unavoidable causes it was impossible to prepare them in time.

FREDERICK TUCKERMAN.

MATHEMATICAL DEPARTMENT.

President JAMES C. GREENOUGH.

SIR:—I have the honor to submit the following brief report of the department of mathematics and physics.

The instruction in this department was placed in my charge at the beginning of the present college year. I found a manifest interest in college duties existing among the students, and thus far the work in every respect has progressed quite satisfactorily. But the success and rapid progress of the higher classes are largely due to the careful preparation and efficient labor of my predecessor, Professor Bassett. The method of instruction is similar to that adopted by higher institutions of learning; viz., the textbook, supplemented by lectures. All fundamental principles are demonstrated before the class. This method saves much time, and affords the student a better opportunity for comprehending the matter under discussion, and learning the manipulation of difficult formulæ.

Much inconvenience, however, is felt in not having suitable apparatus to insure complete success. Mechanics, electricity and civil engineering are well supplied; but apparatus for illustrating the principles of sound, heat and light are wholly deficient. It seems proper to call the attention of the honorable Board of Trustees to this matter, and to recommend that, as soon as they deem it advisable, sufficient means be appropriated to make the lecture-room more convenient, and place the physical cabinet in a suitable and more respectable condition. As mathematics occupies a prominent place in the curriculum, a higher standard

for admission must be apparent to all. One, or perhaps two, books of geometry cannot be of detriment to the student, but will, on the contrary, result in a more advanced college course.

It is earnestly hoped that the several recommendations herein contained will meet the favorable consideration of the honorable Board.

Respectfully submitted.

C. D. WARNER.

MILITARY DEPARTMENT.

JAMES C. GREENOUGH,

President of the Massachusetts Agricultural College.

SIR: — During the present year the work in this department has followed the plan laid down in the last annual report, with but slight changes. The discipline of the corps has been transferred somewhat more than formerly to the first class officers, and thus far with encouraging results. The system adopted of placing certain divisions of the dormitories under the control of the officers, and of holding them responsible for their good order and quiet during study hours, is likely to develop satisfactorily. At no time since my coming has the interest been greater, or the result of the instruction more apparent. It seems proper that I should again urge that some plan be adopted which will enable the corps to go into camp at Framingham for two weeks, yearly, after the close of the summer term. There are no facilities here for giving practical instruction to the cadets in the duties of sentinels and general camp work. It is fundamental for the educated soldier, and none who appreciate the wisdom of having a full supply of capable company and field officers in case of need, could dissent from such legislation as will incorporate this suggestion into the State militia laws. Hereto is appended the theoretical and practical course of the military department, with the names and grades of those holding official positions in the present battalion organization.

I have the honor to be, your respectful servant,

VICTOR H. BRIDGMAN,
First Lieutenant 2d U. S. Artillery.

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

THEORY.

Fall term, Freshman year. One hour per week for the term. Recitations in infantry tactics (Upton's). School of the Soldier. School of the Company. Skirmish drill.

Fall term, Sophomore year. One hour per week for the term. Recitations in U. S. Artillery tactics. School of the Soldier (dismounted), sabre exercise, manual of the piece and mechanical manœuvres, bayonet exercise (infantry tactics). Ammunition, equipment of carriages. Modified service of 8-inch mortars.

Fall term, Junior year. Recitations in infantry tactics (Upton's). One hour per week for the term. School of the battalion. Ceremonies. Company and field service.

MILITARY SCIENCE.

This instruction is given to seniors, extending through the entire college year, two hours per week.

It will include, in the form of lectures and recitations from selected text-books, the following subjects: Ordnance and gunnery; constitutional and military law and history; campaigns and battles; systems of warfare, present and past; an elementary course in strategy and engineering. It will be modified by such additions and changes as shall seem desirable. Essays are required from each senior on military subjects, when they have become sufficiently instructed to prepare them advantageously. These papers will be read in the recitation room for general note and criticism, or before the entire college. One set, all upon the same subject, are

written for prizes,—the award being made by a board of army officers. The successful competitors read their productions at the graduating exercises.

PRACTICE.

All students, unless disqualified physically, are required to attend prescribed military exercises, those who pursue special or partial courses at the college not being exempt so long as they remain at the institution. By the commencement of their second term, students are required to provide themselves with a full uniform, comprising coat, blouse, trousers, cap, white gloves, etc., all of which costs about \$30. Correctness of deportment and discipline are required of all, the routine of the West Point Academy being followed as closely as circumstances will permit. To insure a proper sanitary condition of the college, the commandant makes careful inspections of all rooms and college buildings each Saturday morning, during which all students in full uniform are required to be in their rooms, for the proper police of which they are held to a strict accountability.

At the beginning of each term, issues of such equipments as they will require are made to all students. They will be charged for all injury, loss, and for any neglect in the care of the same.

For practical instruction, the following public property is in the hands of the college authorities :—

One platoon of light Napoleons (dismounted).

One six-pounder with limber and equipments.

Seventy-five sabres and belts.

One hundred breech-loading rifles (latest model).

Several accurate target rifles.

Two 8-inch siege mortars, with complete equipments.

For practice firing, the United States furnishes blank cartridges for all guns, and ball cartridges for rifle practice, which is encouraged by the department.

Drills, amounting to rather less than four hours per week, are as follows :—

Infantry : schools of the soldier, company, and battalion ;

manual of arms and sword ; bayonet exercise, skirmish drill, target practice ; ceremonies, marches, field service.

Artillery : schools of the soldier, detachment, and battery (dismounted). Mortar drill, sabre exercise, pointing, and field service.

BATTALION ORGANIZATION.

For instruction in infantry tactics and discipline, the cadets are organized into a battalion of two or more companies under the commandant. The officers, commissioned and non-commissioned, are selected from those cadets who are best instructed and most soldier-like in the discharge of their duties. As a rule, the commissioned officers are taken from the seniors, the sergeants from the juniors, and the corporals from the sophomores. All seniors are detailed to act as commissioned officers.

Commissioned Staff.

GEORGE H. BARBER, *First Lieutenant and Adjutant.* CHARLES S. PHELPS, *First Lieutenant and Quartermaster.*

Non-commissioned Staff.

GEORGE W. WHEELER, *Sergeant-Major.* DAVID F. CARPENTER, *Quartermaster Sergeant.*

Color Guard.

Sergeants, — KINGSBURY SANBORN, *National Colors.* RICHARD F. DUNCAN, *State Colors.*

Privates, — C. S. HOWE, F. B. CARPENTER, W. H. CALDWELL, W. M. BALL, S. H. LONG, F. C. ALLEN.

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2. EDWIN W. ALLEN, Co. B.
3. EDWARD R. FLINT, Co. C.

Lieutenants.

1. HEZEKIAH HOWELL, Co. A.
2. CHARLES W. BROWNE, Co. B.
3. L. J. DE ALMEIDA, Co. C.

First Sergeants.

1. CHARLES W. CLAPP, Co. A.
2. WINFIELD AYRE, Co. B.
3. JOHN K. BARKER, Co. C.

Sergeants.

- | | |
|------------------------------|------------------------------|
| 1. KINGSBURY SANBORN, Co. B. | 2. RICHARD F. DUNCAN, Co. C. |
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CATALOGUE

OF

TRUSTEES, OVERSEERS, FACULTY AND STUDENTS.

1884.

CALENDAR FOR 1885.

January 7, Wednesday, winter term begins, at 8.15 A.M.

March 27, Friday, winter term closes, at 10.30 A.M.

April 6, Tuesday, summer term begins, at 8.15 A.M.

June 21, Sunday,	{	Baccalaureate sermon. Address before the Christian Union.
June 22, Monday,	{	Grinnell Prize Examination of senior class in Agriculture. Farnsworth Prize Speaking.
June 23, Tuesday,	{	Meeting of the Alumni. Military Exercises. Commencement Exercises. Alumni Dinner. President's Reception.
June 24, Wednesday,		Examination for admission.
September 8, Tuesday,		Examination for admission.
September 9, Wednesday,		fall term begins, at 8.15 A.M.
December 18, Friday,		fall term closes, at 10.30 A.M.

1886.

January 6, Wednesday, winter term begins, at 8.15 A.M.

March 26, Friday, winter term closes, at 10.30 A.M.

TRUSTEES, OVERSEERS, FACULTY, AND STUDENTS.

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JOHN E. RUSSELL, *Secretary of Board of Agriculture.*

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*President.**College Pastor and Professor of Mental and Moral Science, Provisional Instructor of History and Political Economy.***LEVI STOCKBRIDGE,**
*Honorary Professor of Agriculture.***HENRY H. GOODELL, A. M.,**
*Professor of Modern Languages and English Literature.***CHARLES A. GOESSMANN, PH. D.,**
*Professor of Chemistry.***SAMUEL T. MAYNARD, B. S.,**
*Professor of Botany and Horticulture.***MANLY MILES, M. D.,**
Professor of Agriculture.

CLARENCE D. WARNER, B. S.,
Professor of Mathematics and Physics.

HORACE E. STOCKBRIDGE, PH. D.,
Assistant Professor of Chemistry.

Professor of Comparative Anatomy and Veterinary Science.

FIRST LIEUT. VICTOR H. BRIDGMAN, Second Artillery,
 U. S. A.,
Professor of Military Science and Tactics.

JOHN F. WINCHESTER, D. V. S.,
Lecturer on Veterinary Science and Practice.

ROBERT W. LYMAN, Esq.,
Lecturer on Rural Law.

FREDERICK TUCKERMAN, M. D.,
Lecturer on Anatomy and Physiology.

Graduates of 1884.*

Herms, Charles (Boston Univ.),	Louisville, Ky.
Holland, Harry Dickinson (Boston Univ.),	Amherst.
Jones, Elisha Adams (Boston Univ.),	Rockville.
Smith, Llewellyn,	Amherst.
Total,	4

Senior Class.

Allen, Edwin West,	Amherst.
Almeida, Luciano José de,	Bananal, S~o Paulo, Brazil.
Barber, George Holcomb,	Glastonbury, Conn.
Brooks, Paul Cuff Phelps,	Boston.
Browne, Charles William,	Salem.
Cutter, Charles Sumner,	Arlington.
Flint, Edward Rawson,	Boston.
Goldthwait, Joel Ernest,	Marblehead.
Howell, Hezekiah,	Blooming Grove, N. Y.

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the college during any portion of the year 1884.

Leary, Lewis Calvert,	.	.	.	Amherst.
Phelps, Charles Shepard,	.	.	.	Florence.
Putnam, George Herbert,	.	.	.	Millbury.
Taylor, Isaac Newton, Jr.,	.	.	.	Northampton.
Tekirian, Benoni,	.	.	.	Yozgad, Turkey.
Total,	.	.	.	14.

Junior Class.

Atkins, William Holland,	.	.	Westfield.	
Ayres, Winfield,	.	.	Oakham.	
Barker, John King,	.	.	Three Rivers.	
Carpenter, David Frederic,	.	.	Millington.	
Clapp, Charles Wellington,	.	.	Montague.	
Copeland, Alfred Bigelo,	.	.	Springfield.	
Duncan, Richard Francis,	.	.	Williamstown.	
Eaton, William Alfred,	.	.	Piermont-on-Hudson, N. Y.	
Felt, Charles Frederic Wilson,	.	.	Northborough.	
Fowler, John Henry,	.	.	Westfield.	
Kinney, Arno Lewis,	.	.	Lowell.	
Mackintosh, Richards Bryant,	.	.	Dedham.	
Sanborn, Kingsbury,	.	.	Lawrence.	
Smith, Walter Storm,	.	.	Syracuse, N. Y.	
Stone, George Edward,	.	.	Spencer.	
Stone, George Sawyer,	.	.	Otter River.	
Wheeler, George Waterbury,	.	.	Deposit, N. Y.	
Total,	.	.	.	17

Sophomore Class.

Allen, Frederick Cunningham,	.	West Newton.
Almeida, Augusto Luis de,	.	Bananal, São Paulo, Brazil.
Ateshian, Osgan Hagope,	.	Sivas, Turkey.
Avery, David Ebenezer,	.	Plymouth.
Ball, William Monroe,	.	Amherst.
Barrett, Edward William,	.	Milford.
Bond, Richard Henry,	.	Brookline.
Breen, Timothy Richard,	.	Ware.
Brown, Frederick Willard,	.	West Medford.
Brown, Herbert Lewis,	.	Peabody.
Caldwell, William Hutson,	.	Peterboro, N. H.
Carpenter, Frank Berton,	.	Leyden.
Chapin, Clinton Gerdine,	.	Chicopee.
Chase, William Edward,	.	Warwick.

Clarke, Frank Scripture,	.	.	.	Lowell.
Cushman, Ralph Henry,	.	.	.	Bernardston.
Daniels, Joseph Francis,	.	.	.	Somerville.
Davis, Fred Augustus,	.	.	.	Lynn.
Fisherwick, Cyrus Webster,	.	.	.	Palmer.
Fowler, Fred Homer,	.	.	.	North Hadley.
Hathaway, Bradford Oakman,	.	.	.	New Bedford.
Howe, Clinton Samuel,	.	.	.	Marlboro.
Long, Stephen Henry,	.	.	.	East Shelburne.
Marsh, James Morrill,	.	.	.	Lynn.
Marshall, Charles Leander,	.	.	.	Lowell.
Martin, Joseph, second,	.	.	.	Marblehead.
Meehan, Thomas Francis Benedict,	.	.	.	Boston.
Merchant, Charles Eddy,	.	.	.	East Weymouth.
Merritt, Walter Heston,	.	.	.	Amherst.
Nourse, Silas Johnson,	.	.	.	Bolton.
Osterhout, Jeremiah Clark,	.	.	.	Lowell.
Paine, Ansel Wass,	.	.	.	Boston.
Rice, Thomas, second,	.	.	.	Shrewsbury.
Rideout, Henry Norman Waymouth,	.	.	.	Quincy.
Robinson, George Prescott,	.	.	.	Northampton.
Shaughnessy, John Joseph,	.	.	.	Stow.
Stone, Fremont Ernest,	.	.	.	Heath.
Tolman, William Nichols,	.	.	.	Concord.
Torelly, Firmino da Silva,	.	.	.	Rio Grande do Sul, Brazil.
Tucker, Frederick Deming,	.	.	.	Monson.
White, Herbert Judson,	.	.	.	Wakefield.
Total,	.	.	.	41

Freshman Class.

Ayre, Warren,	.	.	.	Lawrence.
Belden, Edward Henry,	.	.	.	North Hatfield.
Cooley, Fred Smith,	.	.	.	Sunderland.
Cutler, George Washington,	.	.	.	Waltham.
Dickinson, Edwin Harris,	.	.	.	North Amherst.
Dole, Edward Johnson,	.	.	.	Chicopee.
Field, Samuel Hall,	.	.	.	North Hatfield.
Foster, Francis Homer,	.	.	.	Andover.
Hayward, Albert Irving,	.	.	.	Ashby.
Hinsdale, Rufus Chester,	.	.	.	Greenfield.
Johnson, Irving Halsey,	.	.	.	Newburyport.
Kinney, Lorenzo Foster,	.	.	.	Worcester.
Knapp, Edward Everett,	.	.	.	East Cambridge.

Loomis, Herbert Russell,	.	.	North Amherst.
Newman, George Edward,	.	.	Newbury.
Noyes, Frank Frederick,	.	.	South Hingham.
Parker, James Southworth,	.	.	Great Barrington.
Richardson, Evan Fussell,	.	.	East Medway.
Rogers, Howard Perry,	.	.	Allston, Boston.
Shepardson, William Martin,	.	.	Warwick.
Shimer, Boyer Luther,	.	.	Redington, Pa.
Smith, Willis Philip,	.	.	Mechanicville, N. Y.
Watson, Charles Herbert,	.	.	Groton.
White, Henry Kirke,	.	.	Whately.
Worthington, Alvan Fisher,	.	.	Dedham.
Total,	.	.	25

Resident Graduates.

Fairfield, B.S., Frank Hamilton (Boston Univ.),	.	.	.	.	Boston.
Groeger, D.Jur., Gustavus (Univ. of Vienna),	.	.	.	.	Amherst.
Hills, B.S., Joseph Lawrence (Boston Univ.),	.	.	.	.	Boston.
Jaqueth, Isaac Samuel,	.	.	.	.	Amherst.
Kingman, B.S., Morris Bird,	.	.	.	.	Amherst.
Lindsey, B.S., Joseph Bridgeo (Boston Univ.),	.	.	.	.	Marblehead.
Preston, B.S., Charles Henry (Boston Univ.),	.	.	.	.	Danvers.
Smith, B.S., Llewellyn,	.	.	.	.	Amherst.
Stone, B.S., Winthrop Ellsworth,	.	.	.	.	Amherst.
Wheeler, B.S., Homer Jay (Boston Univ.),	.	.	.	.	Bolton.

Summary.

Resident Graduates,	.	.	.	.	.	.	.	10
Graduates of 1884,	.	.	.	.	.	.	.	4
Senior Class,	.	.	.	.	.	.	.	14
Junior Class,	.	.	.	.	.	.	.	17
Sophomore Class,	.	.	.	.	.	.	.	41
Freshman Class,	.	.	.	.	.	.	.	25
Total,	.	.	.	.	.	.	.	111

Graduates.

- Allen, Francis S., '82, American Veterinary College, New York City, house surgeon.
- Allen, Gideon H., '71, Winfield, Cowley Co., Kansas, Wells, Fargo & Co.'s Express agent.
- Aplin, George T., '82, East Putney, Vt., farmer.
- Bagley, David A., '76.
- Bagley, Sydney C., '83, 35 Lynde Street, Boston, no business.
- Baker, David E., '78, Newton Lower Falls, physician and surgeon.
- Barrett, Joseph F., '75, 84 Broad Street, New York City, Bowker Fertilizer Co., travelling salesman.
- Barri, John A., '75, Water Street and Fairfield Avenue, Bridgeport, Conn., Chittenden, Barri & Sanderson, National Fertilizer Co.
- Bassett, Andrew L., '71, New York City, Vermont C. R. R. & Steamship Co., clerk.
- Beach, Charles E., '82, care Beach & Co., Hartford, Conn., farmer.
- Bell, Burleigh C., '72, 16th and Howard Streets, San Francisco, Cal., druggist and chemist.
- Bellamy, John, '76, 659 Washington Street, Boston, Nichols, Bellamy & Co., hardware and cutlery.
- Benedict, John M., '74, Commercial Block, 77 Bank Street, Waterbury, Conn., physician.
- Benson, David H., '77, North Weymouth, Bradley Fertilizer Co., analytical and consulting chemist and superintendent of chemical works.
- Bingham, Eugene P., '82, 352 Atlantic Avenue, Boston, manufacturing chemist.
- Birnie, William P., '71, Springfield, Birnie Paper Co.
- Bishop, Edgar A., '83, Diamond Hill, R. I., farmer.
- Bishop, William H., '82, Tongaloo, Miss., Tongaloo University, superintendent of farming department.
- Blanchard, William H., '74, Westminster, Vt., farm laborer.
- Boutwell, Willie L., '78, Leverett, farmer.
- Bowker, William H., '71, 43 Chatham Street, Boston, president Bowker Fertilizer Co.
- Bowman, Charles A., '81, 7 Exchange Place, Boston, office of Aspinwall & Lincoln, civil engineer.
- Boynton, Charles E., '81, Groveland, student.
- Bragg, Everett B., '75, Glidden & Curtis, Tremont Bank Building, Boston, chemist.
- Braune, Domingos H., '83, Nova Friburgo, Province of Rio de Janeiro, Brazil, planter.

- Brett, William F., '72, Brockton, R. H. White & Co., 518 Washington Street, Boston, clerk.
- Brewer, Charles, '77, 30 Court Street, Utica, N. Y., florist.
- Brigham, Arthur A., '78, Marlborough, farmer.
- Brodt, Harry S., '82, Rawlins, Wyoming Territory, care Central Association of Wyoming, surveyor.
- Brooks, William P., '75, Japan Agricultural College, Sapporo, Japan, professor of agriculture.
- Bunker, Madison, '75, Newton, veterinary surgeon.
- Callender, Thomas R., '75, Everett, florist.
- Campbell, Frederick G., '75, West Westminster, Vt., farmer.
- Carr, Walter F., '81, University of Minnesota, Minneapolis, Minn., assistant professor of civil engineering and physics.
- Caswell, Lilley B., '71, Athol, civil engineer and farmer.
- Chandler, Edward P., '74, Fort Maginnis, Montana, Chandler, Chamberlain & Co., wool growers.
- Chandler, Everett S., '82, 20 Orchard Street, North Cambridge, law office of Sumner Albee, 30 Court Street, Boston, student.
- Chapin, Henry E., '81, Raleigh, N. C., "North Carolina Farmer," assistant editor.
- Chickering, Darius O., '76, Enfield, farmer.
- Choate, Edward C., '78, Southborough, farmer.
- Clark, Atherton, '77, 131 Tremont Street, Boston, clerk.
- Clark, John W., '72, Hadley, farmer.
- Clark, Xenos Y., '75 ('78), P. O. Box 166, Amherst, scientist.
- *Clay, Jabez W., '75.
- Coburn, Charles F., '78, Lowell, teller Five Cents Savings Bank and editor "Daily Citizen."
- Cooper, James W., Jr., '82, East Bridgewater, drug clerk.
- Cowles, Frank C., '72, city engineer's office, Worcester, civil engineer.
- Cowles, Homer L., '71, Amherst, farmer.
- †Curtis, Wolfred F., '74.
- Cutter, John A., '82, 213 West Thirty-fourth Street, New York City, student at Albany Medical College.
- Cutter, John C., '72, Imperial College of Agriculture, Sapporo, Japan, consulting physician Sapporo Ken Hospital and professor of physiology and comparative anatomy.
- Damon, Samuel C., '82, Lancaster, farmer.
- Deuel, Charles F., '76, Amherst, druggist.
- Dickinson, Richard S., '79, Columbus, Nebraska, farmer.
- Dodge, George R., '75, Brighton, Bowker Fertilizer Co., superintendent.

* Died Oct. 1, 1880, of pneumonia, at New York City.

† Died Nov. 8, 1878, of inflammation of the brain, at Westminster.

- Dyer, Edward N., '72, Kohala, S. I., pastor Native Church.
Easterbrook, Isaac H., '72, Diamond Hill, R. I., farmer.
Eldred, Frederick C., '73, 128 Chambers Street, New York City,
 New York manager of Montpelier Carriage Co.
Ellsworth, Emory A., '71, 164 High Street, Holyoke, architect and
 mechanical and civil engineer.
Fairfield, Frank H., '81, 30 Kilby Street, Boston, Standard Fertil-
 izer Co., chemist.
Fisher, Jabez F., '71, Fitchburg, freight cashier Fitchburg Rail-
 road Co.
Fiske, Edward R., '72, 625 Chestnut Street, Philadelphia, Pa.,
 Folwell Bro. & Co., merchant.
Flagg, Charles O., '72, Diamond Hill, R. I., farmer.
Flint, Charles L., Jr., '81, 29 Newbury Street, Boston, Sawyer's
 Commercial College, student.
*Floyd, Charles W., '82.
Foot, Sanford D., '78, 101 Chambers Street, New York City,
 Kearney Foot & Co., file manufacturers.
Fowler, Alvan L., '80, address Westfield, cattle raiser, California.
Fuller, George E., '71.
Gladwin, Frederic E., '80, Tombstone, Arizona, assayer.
Goodale, David, '82, Marlborough, farmer.
Green, Samuel B., '79, Mountainville, Orange Co., N. Y., superin-
 tendent horticultural department, Houghton, Farm.
Grover, Richard B., '72, Newburyport, Belleville Church, acting
 pastor.
Guild, George W. M., '76, 17 and 19 Cornhill, Boston, wire business.
Hague, Henry, '75, South Worcester, St. Matthews, rector.
Hall, Josiah N., '78, Sterling, Weld Co., Col., physician.
Harwood, Peter M., '75, Barre, farmer.
Hashiguchi, Boonzo, '81, department of commerce and agriculture,
 Tokio, Japan, president Government Sugar Beet Co.
†Hawley, Frank W., '71.
Hawley, Joseph M., '76, Berlin, Wis., C. A. Mather & Co., banker.
Herms, Charles, '81, 1223 Third Avenue, Louisville, Ky., stock-
 breeder.
†Herrick, Frederick St. C., '71.
Hevia, Alfred A., '83, Guatemala, Central America, New York Life
 Insurance Co., Apartado 77, sub-agent Central American Re-
 publics.
Hibbard, Joseph R., '77, Stoughton, Wis., farmer.
Hillman, Charles D., '82, Fresno City, Cal., nurseryman.

* Died Oct. 10, 1883, of consumption, at Dorchester.

† Died Oct. 28, 1883, of congestive apoplexy, at Belchertown.

‡ Died Jan. 19, 1884, at Lawrence.

- Hills, Joseph L., '81, New Brunswick, N. J., State Agricultural Experiment Station of New Jersey, assistant chemist.
- Hitcheock, Daniel G., '74, Warren, American Express Co., agent.
- Hobbs, John A., '74, Bloomington, Neb., farmer.
- Holland, Harry D., '84, Amherst, S. Holland & Son, clerk.
- Holman, Samuel M., Jr., '83, Attleborough, farmer.
- Holmes, Lemuel Le B., '72, Mattapoisett, lawyer.
- Howard, Joseph H., '82, Springfield Gas-Light Co., Springfield, meter inspector.
- Howe, Charles S., '78, 549 East Middlebury Street, Akron, Ohio, Buchtel College, professor of mathematics.
- Howe, Elmer D., '81, Marlborough, farmer.
- Howe, George D., '82, North Hadley, C. D. Dickinson & Son, manufacturers, clerk.
- Howe, Waldo V., '77, Newburyport, no business.
- Hubbard, Henry F., '78, 94 Front Street, New York City, with John H. Catherwood & Co.
- Hunt, John F., '78, Sunderland, market gardener.
- Jones, Elisha A., '84, Rockville, no business.
- Kendall, Hiram, '76, Providence, R. I., Kendall Manufacturing Co., superintendent and chemist.
- Kimball, Francis E., '72, 15 Union Street, Worcester, E. W. Vaill, book-keeper.
- Kingman, Morris B., '82, Amherst, resident graduate, Agricultural College.
- Kinney, Burton A., '82, Portland, Me., Signal Corps, United States Army.
- Knapp, Walter H., '75, Wellesley Hills, florist.
- Koch, Henry G. H., '78, Sixth Avenue and Twentieth Street, New York City, H. C. F. Koch & Son.
- Ladd, Thomas H., '76, Care William Dadmun, Watertown, no business.
- Lee, Lauren K., '75, Valley Springs, Dak., dealer in flaxseed.
- Lee, Willian G., '80, 131 Tremont Street, Boston, clerk.
- Leland, Walter S., '73, Concord, officer, State Prison.
- Leonard, George, '71, Springfield, lawyer.
- Libby, Edgar H., '74, Greenfield, publisher, "American Garden."
- Lindsey, Joseph B., '83, Pawtucket, R. I., L. B. Darling Fertilizer Co., chemical agent.
- Livermore, Russell W., '72, Pates, Robeson Co., North Carolina, merchant.
- Lovell, Charles O., '78, Northampton, Photographer.
- Lyman, Asahel H., '73, Manistee, Mich., druggist.
- Lyman, Charles E., '78, Middlefield, Conn., farmer.

- *Lyman, Henry, '74.
Lyman, Robert W., '71, Belchertown, lawyer and lecturer, Massachusetts Agricultural College.
Mackie, George, '72, Attleborough, Physician.
Macleod, William A., '76, 60 Devonshire Street, Boston, patent lawyer.
Mann, George H., '76, Sharon, superintendent of Cotton Duck Mills.
Martin, Willliam E., '76, Excelsior, Minn., postmaster.
May, Frederick G., '82, Conway, Orange Co., Fla., orange grower.
Maynard, Samuel T., '72, Amherst, Massachusetts Agricultural College, professor of Botany and Horticulture.
Mc Connel, Charles W., '76, 59 North Pearl Street, Albany N. Y., dentist.
McQueen, Charles M., '80, First National Bank Building, Dearborn and Monroe Streets, Chicago, Ill., Standard Book Co., publisher.
Miles, George M., '75, Miles City, Montana, Miles & Strevell, jobbers of hardware and dealers in live stock.
Mills, George W., '73, Medford, physician.
Minor, John B., '73, New Britain, Conn., Russell & Erwin Manufacturing Co., clerk.
Minott, Charles W., '83, Three Rivers, Ruggles & Minott, nurserymen.
Montague, Arthur H., '74, South Hadley, farmer.
Morey, Herbert E., '72, 49 Haverhill Street, Boston, Morey, Smith & Co., merchant.
†Morse, James H., '71.
Morse, William A., '82, Thompson's Island, Boston Harbor, farmer.
Myrick, Herbert, '82, Springfield, assistant editor "New England Homestead."
Myrick, Lockwood, '78, Williams, Clark & Co., New York City, chemical agent.
Nichols, Lewis A., '71, Danvers, Boston City Water Works, civil engineer.
Norcross, Arthur D., '71, Monson, postmaster.
Nourse, David O., '83, Berlin, Conn., superintendent Berlin Orchard of Connecticut Valley Orchard Company.
Nye, George E., '77, 70 Exchange Building, Union Stock Yards, Chicago, Ill., G. F. Swift & Co., book-keeper.
Osgood, Frederick H., (M.R.C.V.S.), '78, 238 Pine Street, Springfield, veterinary surgeon.

* Died Jan. 8, 1879. of pnemonia, at Middlefield, Conn.

† Died June 21, 1883, of Bright's disease, at Salem.

- Otis, Harry P., '75, Leeds, Northampton Emery Wheel Company, superintendent.
- Page, Joel B., '71, Conway, farmer.
- Paige, James B., '82, Prescott, F. B. Paige & Son, Mellen Valley Fruit Farm.
- Parker, George A., '76, Halifax, Old Colony Railroad, landscape gardener.
- Parker, George L., '76, Dorchester, florist.
- Parker, Henry F., '77, 5 Beekman Street, Temple Court, New York City, mechanical engineer.
- Parker, William C., '80, Wakefield, farmer.
- Peabody, William R., '72, Atchison, Kansas, Atchison, Topeka & Santa Fé Railroad, general agent.
- Penhallow, David P., '73, Montreal, Canada, McGill University, professor of botany and vegetable physiology.
- Perkins, Dana E., '82, care C. M. Winchell, U. S. Survey Boat, Tennessee, Mississippi River Commission.
- Peters, Austin, '81, Royal Veterinary College, Camden Town, London, England, student.
- Phelps, Charles H., '76, South Framingham, florist.
- Phelps, Henry L., '74, Southampton, farmer.
- Plumb, Charles S., '82, Geneva, N. Y., New York Agricultural Experiment Station, assistant director.
- Porter, William H., '76, Watertown, S. R. Payson's Farm, foreman.
- Porto, Raymundo M. da S., '77, Para, Brazil, planter.
- Potter, William S., '76, Lafayette, Ind., Rice & Potter, lawyer.
- Preston, Charles H., '83, with Milk Inspector, 1151 Washington Street, Boston, chemist.
- Rawson, Edward B., '81, Lincoln, Loudoun Co., Va., farmer.
- Renshaw, James B., '73, Spokane Falls, Washington Territory, clergyman.
- Rice, Frank H., '75, Hawthorne, Nev., county recorder.
- Richmond, Samuel H., '71, Altoona, Orange Co., Fla., magistrate and orange grower.
- Ripley, George A., '80, 387 Main Street, Worcester, no business.
- Root, Joseph E., '76, 72 Pearl Street, Hartford, Conn., physician and surgeon.
- Rudolph, Charles, '79, Mitchell, Dak., lawyer.
- Russell, William D., '71, Turner's Falls, Montague Paper Co.
- Salisbury, Frank B., '72, Kimberley Diamond Fields, South Africa, trader.
- Sears, John M., '76, Ashfield, farmer.
- Shaw, Elliot D., '72, Holyoke, florist.

- Sherman, Walter A., '79, 182 Central Street, Lowell, veterinary surgeon.
- Shiverick, Asa F., '82, Wood's Holl, Pacific Guano Co., chemist.
- Simpson, Henry B., '73, Centreville, Md., farmer.
- Smead, Edwin, '71, Watkinson Orphan Asylum, Hartford, Conn., instructor in farming and gardening.
- Smith, Frank S., '74, Hampden, no business.
- Smith, George P., '79, Sunderland, farmer.
- Smith, Hiram F. M., '81, 58 Green Street, Cambridgeport, Harvard Medical School, student.
- Smith, Llewellyn, '84, Amherst, Resident Graduate Massachusetts Agricultural College.
- Smith, Thomas E., '76, West Chesterfield, manufacturer.
- Snow, George H., '72, Leominster, farmer.
- Somers, Frederick M., '72, 49 Broadway, New York City, Watson & Gibson, brokers.
- *Southmayd, John E., '77.
- Southwick, Andre A., '75, care Beach & Co., Hartford, Conn., superintendent "Vine Hill and Ridge Farms."
- Spalding, Abel W., '81, 907 North Main Street, St. Louis, Mo., Ripley & Kimball, clerk.
- Sparrow, Lewis A., '71, 19 South Market Street, Boston, Judson & Sparrow, dealers and manufacturers of fertilizers.
- Spofford, Amos L., '78, West Newbury, farmer.
- Stockbridge, Horace E., '78, Amherst, Massachusetts Agricultural College, assistant professor of chemistry.
- Stone, Almon H., '80, Phillipston, farmer.
- Stone, Winthrop E., '82, Amherst, State Agricultural Experiment Station, assistant chemist.
- Strickland, George P., '71.
- Swan, Roscoe W., '79, 32 Pleasant Street, Worcester, physician.
- Taft, Cyrus A., '76, Whitinsville, draughtsman.
- Taft, Levi R., '82, Columbia, Mo., Missouri Agricultural College, professor of horticulture.
- Taylor, Alfred H., '82, Burnett, Neb., dealer in live stock.
- Taylor, Frederick P., '81, Athens, East Tenn., farmer.
- Thompson, Edgar E., '71, East Weymouth, teacher.
- Thompson, Samuel C., '72, corner 146th Street and 3d Avenue, New York City, Department of Public Works, civil engineer.
- Thurston, Wilbur H., '82, Mountainville, Orange Co., N. Y., Experiment Department, Houghton Farm.
- Tucker, George H., '71, Fargo, Dak., civil engineer.
- Tuckerman, Frederick, '78, Amherst, physician and lecturer, Agricultural College.

* Died December 11, 1878, of consumption, at Minneapolis, Minn.

- Urner, George P., '76, Melville, Gallatin Co., Montana, sheep raiser.
- Wakefield, Albert T., '73, 301 Main Street, Peoria, Ill., physician.
- Waldron, Hiram E. B., '79, North Rochester, farmer.
- Ware, Willard C., '71, 255 Middle Street, Portland, Me., Boston & Portland Clothing Co., manager.
- Warner, Clarence D., '81, Amherst, Massachusetts Agricultural College, professor of mathematics and physics.
- Warner, Seth S., '73, 43 Chatham Street, Boston, Bowker Fertilizer Company, travelling salesman.
- Washburn, John H., '78, Mansfield, Conn., Storrs Agricultural School, professor of general and agricultural chemistry.
- Webb, James H., '73, 69 Church Street, New Haven, Conn., Alling & Webb, attorneys and counsellors at law.
- Wellington, Charles, '73, Göttingen, Germany, student.
- Wells, Henry, '72, London, England, business.
- Wetmore, Howard G., '76, 41 West Ninth Street, New York City, physician.
- Wheeler, Homer J., '83, Amherst, State Agricultural Experiment Station, assistant chemist.
- Wheeler, William, '71, 70 Kilby Street, Boston, civil engineer.
- Whitney, Frank Le P., '71, Roxbury, Boston, dealer in shoes.
- Whitney, William C., '72, Minneapolis, Minn., architect.
- Whittaker, Arthur, '81, Needham, farmer.
- Wilcox, Henry H., '81, Nawiliwili, S. I., sugar planter.
- Wilder, John E., '82, 179 Lake Street, Chicago, Ill., with Wilder & Hale, dealers in leather.
- Williams, James S., '82, North Glastonbury, Conn., farmer.
- Williams, John E., '76, Amherst, editor "Amherst Record."
- Winchester, John F., '75, Lawrence, veterinary surgeon and lecturer, Massachusetts Agricultural College.
- Windsor, Joseph L., '82, St. Paul, Minn., Office North Pacific Railroad Co., private secretary to local treasurer.
- Wood, Frank W., '73.
- Woodbury, Rufus P., '78, Kansas City, Mo., news and telegraph editor of "Kansas City Daily Times."
- Woodman, Edward E., '74, Danvers, E. & C. Woodman, florists.
- Wyman, Joseph, '77, Cambridgeport, book-keeper at 52 to 60 Blackstone Street, Boston.
- Zeller, Harrie McK., '74, Hagerstown, Md., Baltimore & Ohio Telegraph Co., manager of commercial office.

COURSE OF STUDY AND TRAINING.

Freshman Year.

Fall Term.

ALGEBRA. — Wells's University Algebra.

BOTANY. — Structural Botany and the study of the functions of vegetable organisms.

FRENCH. — Principles and applications of grammar, pronunciation, oral and written exercises in translating from French into English and from English into French. Keetel's French Grammar. Readings from French authors.

HISTORY. — Ancient Greece and Rome, with reference to modern institutions. Modes of life and institutions of the Middle Ages, with reference to the evolution of our political and other institutions.

Winter Term.

PLANE GEOMETRY AND THEORY OF EQUATIONS. — Wentworth's Geometry.

MICROSCOPY. — The study and the use of the Microscope. The Microscope, by Carpenter.

FREE-HAND DRAWING. — White's Series. Object Drawing and Original work.

FRENCH. — Translations, oral and written, from French into English.

HISTORY. — Beginnings of Modern History. Period of the Protestant Revolution. Thirty Years' War. Development of the nationalities of Western Europe. Progress of civil freedom.

Summer Term.

SOLID GEOMETRY. — Wentworth's Geometry.

BOTANY. — Analysis. Systems of classification. Practical exercises in classification and in collecting and arranging herbaria. Bessey's Botany. Gray's Manual.

FRENCH. — Translation of some scientific or historic work, as Puydt Les Plantes de Sewe.

AGRICULTURE. — History of Domestic Animals. Characteristics and development of different breeds, illustrated by stereopticon views of typical forms.

Freshmen who do not study "History" and "Agriculture," elect French.

Sophomore Year.*Fall Term.*

CONIC SECTIONS AND PLANE TRIGONOMETRY.— Griffin's Conic Sections. Wells's Trigonometry.

BOTANY.— Systematic Botany. Special study of useful and common plants. Bessey's Botany. How Plants Grow, by Johnson

CHEMISTRY.— Elementary Inorganic Chemistry. Instruction given by lectures and text-book, and all important facts experimentally demonstrated. Introduction to the Study of Chemistry. Nomenclature. Symbols. Atomic Weights. Water and its constituents. Air and its constituents. Quantivalence. Radicals, Stoichiometry. Acids. Bases. Salts. Consecutive consideration of the non-metallic elements.

GERMAN.— Sheldon's Grammar. Boisen's Reader. Oral and written exercises.

AGRICULTURE.— Stock breeding; laws of heredity; causes of variation; in-and-in breeding and cross-breeding; form of animals as an index of qualities; selection and care of animals; feeding for meat production; the dairy and its work.

Winter Term.

SPHERICAL TRIGONOMETRY AND MENSURATION.— Measurement of lines angles, surfaces, solids and volumes. Wells's Trigonometry. Todhunter's Mensuration.

CHEMISTRY.— Metals of the alkalies. Metals of the alkaline earths. Metals of each succeeding group considered distinctively. Each element and subject is first treated from a theoretical standpoint, and then the agricultural and technical significance of the facts learned are considered.

ANATOMY AND PHYSIOLOGY.— Descriptive Anatomy by means of skeletons, elastic models, fresh specimens, dissection, diagrams and charts. Lectures and discussion of topics. Microscopic anatomy. Chemical analysis.

MECHANICAL DRAWING.— White's Series. Use of instruments. Building plans, specifications, etc.

GERMAN.— Eichendorff. Aus dem Leben eines Taugenichts. Oral and written exercises.

AGRICULTURE.— History of Agriculture, with particular reference to the development of systems and rules of practice. Pioneer farming, its methods and results. Mixed husbandry,— general principles and their special applications; cereals, forage crops, pastures and meadows. Drainage, general principles; different kinds of drains; laying out and construction of drains; improved methods of laying tiles.

Summer Term.

CIVIL ENGINEERING.—Practical work with instruments in measuring heights and distances. Plane and topographical surveying, leveling, construction of railroad curves, embankments and excavations, drainage, etc.

ZOOLOGY.—Introductory lessons by means of specimens. Systems of classification. The analytic study of typical forms of animal life.

GERMAN.—Rau. Die Grundlage der Modernen Chemie. Oral and written exercises.

HORTICULTURE.—Cultivation and propagation of fruits. Lectures, with oral and written abstracts.

Sophomores who do not study "Agriculture" and "Horticulture," elect German.

*Junior Year.**Fall Term.*

MECHANICS.—Lectures. Oral and written abstracts. Dana's Mechanics.

ENGLISH LITERATURE.—Lectures on the early history of the English Nation and formation of the language. Study of the early literature.

GEOLOGY.—Instruction given by lectures, by text-book, and by constant field work in the study of rocks and geological formations, with particular reference to the recognition of the characteristics of the different periods of geological history, and the application of the facts gained, to agriculture, as related to the formation, composition and characteristics of soils.

LATIN.

HORTICULTURE.—Market gardening and floriculture. Entomology, with special reference to injurious and beneficial insects. Packard's Guide to Study of Insects.

Winter Term.

PHYSICS AND ANALYTICAL GEOMETRY.—Atkinson's Ganot's Physics, new edition. Loomis's Analytical Geometry.

ENGLISH LITERATURE.—Study of Shakespeare. Lectures on the historic epochs in connection with the text-book. Original theses.

CHEMISTRY.—Instruction in the laboratory, with recitations. Blow-pipe analysis, with the determination of the characteristics of the more common metals and minerals. Determination of unknown substances. Humid analysis. Determination of characteristics of all the commonly occurring elements. Determination of bases and acids in known compounds.

LATIN.

AGRICULTURE.—Soils; farm implements; manures; rotation of crops.

*Summer Term.***PHYSICS AND DIFFERENTIAL CALCULUS.**

CHEMISTRY.—Determination of qualitative composition of unknown substances. Analysis of fertilizers, of soils, and of agricultural and technical raw products.

CHEMICAL GEOLOGY.—Instruction by lectures. Formation of rocks, geological stages or periods with the characteristic formations of each period, and the phenomena accompanying each change. Chemical composition of the rocks forming the earth's crust, with a review of the minerals constituting these rocks. Chemical changes by which the rocks have been converted into an arable soil. The chemical characteristics of the resulting soil as related to the production of plants.

LATIN.

HORTICULTURE.—Forestry and landscape gardening. Methods of propagation and cultivation of forest trees. Study of trees and plants most desirable for land decoration, with principles and rules of arrangement. Lectures, with oral and written abstracts. Hough's Elements of Forestry.

Juniors who do not study "Agriculture" and "Horticulture," elect Latin.

Senior Year.*Fall Term.*

PHYSICS AND INTEGRAL CALCULUS.—Loomis's Differential and Integral Calculus.

CHEMISTRY.—Analysis of prominent products of chemical industry. Special lectures upon the same.

MENTAL SCIENCE.—Outline by inductive teaching, and by lectures. Study of topics aided by Porter, Cousin, Hamilton, etc. Oral recitations by topics and written abstracts. History of philosophy. Lectures.

Winter Term.

CHEMISTRY.—Organic chemistry with reference to applications in agriculture and other industries.

POLITICAL ECONOMY.—Treatment of the subject by lectures, discussions and abstracts. Laughlin's Mill's Political Economy. Perry's Political Economy.

BIOLOGY.—The study of forms of life, their structure and functions. Laboratory practice and experiments. Biology in its relations to agriculture.

ASTRONOMY

*Summer Term.***ANTHROPOLOGY.**

MORAL SCIENCE. — Outline of principles by inductive teaching and by lectures. Discussions. Recitations by topics and by abstracts. Philosophic Basis of Theism, by Harris. Hopkin's Law of Love.

HISTORY OF MODERN PHILOSOPHY. — Lectures.

VETERINARY SCIENCE. — Lectures.

RURAL LAW. — Lectures.

CONSTITUTIONAL HISTORY. — Origin and development of the English Constitution. Colonial governments. Government of the United States. History of political parties. Development of popular governments in Europe during the present century.

METEOROLOGY.

The studies of the Senior Year are in good degree class electives.

In all studies, students are to be trained to accurate and ready oral and written expression, and to use drawing as language. Military tactics and military drill, as ordered, throughout the course. Weekly exercises in compositions and declamations throughout the course. The instruction in agriculture and horticulture is both theoretical and practical. Instruction in the field and manual training is given whenever such instruction and training will conduce to the progress of the student. Students are allowed to work for wages during such leisure hours as are at their command. A limited amount of work has been found to be beneficial, but work that withdraws the energy of the student from his studies is unprofitable to him. Students sometimes earn from fifty to one hundred dollars per annum. Those who complete the course receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the college may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the college, thereby becoming entitled to all the privileges of the alumni.

ADMISSION.

Candidates for admission to the Freshman Class are examined orally and in writing, upon the following subjects: English Grammar, Geography, Arithmetic, Algebra through simple equations, the History of the United States, and the Metric System.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the college until he is fifteen years of age. Every applicant is required to furnish a certificate of good character from his late pastor or teacher. Candidates are requested to furnish the Examining Committee with their standing in the schools they have last attended. The previous rank of the candidate will be considered in admitting him.

EXPENSES.

Tuition in advance.						
Fall term,	.	.	.	.	\$30 00	
Spring term,	.	.	.	.	25 00	
Summer term,	.	.	.	.	25 00	\$80 00
Room-rent, in advance, \$5.00 to \$10.00						\$80 00
per term,	.	.	.	.	15 00	30 00
*Board, \$3.50 to \$5.00 per week,	.	.	.	.	133 00	190 00
Washing, 30 to 50 cents per week,	.	.	.	.	11 40	19 00
Fuel, \$5.00 to \$15.00 per year,	.	.	.	.	5 00	15 00
Expense per year,	.	.	.	.	\$244 40	\$384 00

To the above must be added thirty dollars to obtain a military suit, which is to be obtained during the first term of attendance at college, and is to be used in drill exercises during the four years' course. Those who use the laboratory for practical chemistry will be charged ten dollars per term. Some expense will also be incurred for lights and for text-books. Students whose homes are within the State of Massachusetts can, in most cases, obtain a scholarship by applying to the senator of the district in which they live. The outlay of money can be further reduced by work during leisure hours on the farm or in the botanic department. The opportunities for such work are more abundant during the Fall and Winter terms.

* Several students, during most of the year, have formed a club and furnished themselves with board for about two dollars and fifty cents per week.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given: In the south dormitory the main corner rooms are fifteen by eighteen feet, and the adjoining bedrooms eight by twelve feet. The inside rooms are fourteen by fifteen feet, and the bedrooms eight by eight feet. In the north dormitory the corner rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

THE ROBINSON SCHOLARSHIP.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

CONGRESSIONAL SCHOLARSHIPS.

The trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter college with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture.

STATE SCHOLARSHIPS.

The legislature of 1883 passed the following Resolve in favor of the Massachusetts Agricultural College: —

Resolved, That there shall be paid annually, for the term of four years, from the treasury of the Commonwealth to the treasurer of the Massa-

chusetts Agricultural College, the sum of ten thousand dollars, to enable the trustees of said college to provide for the students of said institution, the theoretical and practical education required by its charter and the law of the United States relating thereto.

Resolved, That annually for the term of four years, eighty free scholarships be and hereby are established at the Massachusetts Agricultural College, the same to be given by appointment to persons in this Commonwealth, after a competitive examination, under rules prescribed by the president of the college, at such time and place, as the senator then in office from each district shall designate; and the said scholarships shall be assigned equally to each senatorial district; but if there shall be less than two successful applicants for scholarships from any senatorial district, such scholarships may be distributed by the president of the college equally among the other districts, as nearly as possible, but no applicant shall be entitled to a scholarship unless he shall pass an examination in accordance with the rules to be established as herein before provided.

In accordance with these resolves, any one desiring admission to the college can apply to the senator of his district for a scholarship.

PRIZES.

FARNSWORTH RHETORICAL PRIZES.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, the income of which is to be used as prizes, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Clafin of Boston has given the sum of one thousand dollars for the endowment of a first prize of forty dollars, and a second prize of twenty-five dollars, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILL'S BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1885, a prize of fifteen dollars is offered, and, for the second best, a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the College Farm.

BOOKS, APPARATUS, AND SPECIMENS IN NATURAL HISTORY.

The Library of the College contains at present about three thousand volumes. The income of the fund raised by the alumni and others is devoted to its increase, and additions are made from time to time, as the needs of the several departments require.

The State Cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the College, and is of much value for purposes of instruction. It has recently received valuable additions of several thousand specimens of minerals, fossils, shells, insects and birds' eggs and nests.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About Fifteen Hundred Species and Varieties of Plants are cultivated in the Durfee Plant House, affording the student an invaluable opportunity of studying the most important types of the vegetable kingdom in their scientific and economic relations.

The Class in Microscopy has the use of Tolles's best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces.

POST-GRADUATE COURSE.

Graduates of colleges and scientific schools may become candidates for the degree of Doctor of Science, or Doctor of Philosophy, from the College or from the University, and pursue their studies under the direction of Professor Goessmann in chemistry, or other members of the Faculty in their respective departments.

PHYSICAL CULTURE.

The military exercises in the open air, or in a spacious hall provided for the purpose, tend to promote health, erect form, and prompt, effective and graceful movement.

RELIGIOUS SERVICES.

Chapel exercises every morning at a quarter after eight o'clock. On Sundays the students attend morning service in the chapel, unless, by request of their parents, arrangements are made to attend church elsewhere. On Sabbath afternoons, or immediately following the morning service, there is opportunity for every student to study the Bible in a Bible class.

The Young Men's Christian Association holds weekly meetings. The Sabbath evening services in churches about one mile distant, and meetings conducted by the students, furnish additional opportunities for religious culture.

CONDUCT.

Students are expected to co-operate with their instructors and with each other in promoting the welfare of the college, in order that every student may receive the best possible results of the course of study and training. Whenever it is evident that it is not for the good of a student to remain in the college, or that the welfare of the college requires that he should not remain, he will be dismissed.

LOCATION.

Amherst is on the New London & Northern R.R., connecting at Palmer with the Boston & Albany R.R., and at Miller's Falls with the Fitchburg R.R. A stage route of seven miles connects Amherst at Northampton with the Connecticut River R.R., and with the New Haven & Northampton R.R. The college buildings are on a healthful site commanding one of the finest views in New England. The large farm of three hundred and eighty-three acres, with its varied surface and native forests, gives the student the freedom and the quiet of a country home. The surrounding country is very helpful to the student of natural science. The location of the buildings prevents the student from the interruptions to study, incident on residence in a town or city, and helps to secure all the moral as well as the intellectual advantages of a college in the country.

Statement of the Cash Receipts and Expenses of the Mass. Agricultural College for the Year ending Jan. 1, 1885.

	RECEIPTS.	PAYMENTS.
Cash in the hands of the treasurer, Jan., 1884,	\$3 45	-
" " " " bursar, " "	318 48	-
Botanic account,	6,948 97	\$7,804 73
Farm account,	4,019 64	5,383 94
Term bill account,	4,536 58	1,171 67
Expense account,	206 66	6,512 32
Boarding-house account,	3,949 77	5,537 72
Laboratory account,	397 89	499 79
Farnsworth Prize account,	50 00	70 00
Mary Robinson Fund account,	70 00	84 00
Grinnell Prize account,	75 00	80 00
Hills Fund account,	592 00	498 15
Whiting Street Fund account,	20 00	-
Totten Prize account,	-	25 00
Salary account,	-	9,044 98
Plant house, construction account,	6 89	434 61
Drill hall, construction account,	-	589 41
President's house, construction account,	-	9,224 20
Repairs of North College, etc., account,	-	6,753 24
State treasurer, scholarships appropriation,	10,000 00	-
" " income of endowment fund,	11,821 85	-
" " appropriation for president's house and repairs,	11,062 75	-
Interest account,— received on deposits in the bank,	39 93	-
Cash on hand, Jan., 1885	-	406 10
	\$54,119 86	\$54,119 86

O. B. HADWEN, *Treas.*

AMHERST, MASS., Jan. 1, 1885.

PUBLIC DOCUMENT.

No. 31.

TWENTY-THIRD ANNUAL REPORT

OF THE

TRUSTEES

OF THE

MASSACHUSETTS

AGRICULTURAL COLLEGE,

AND

CATALOGUE.

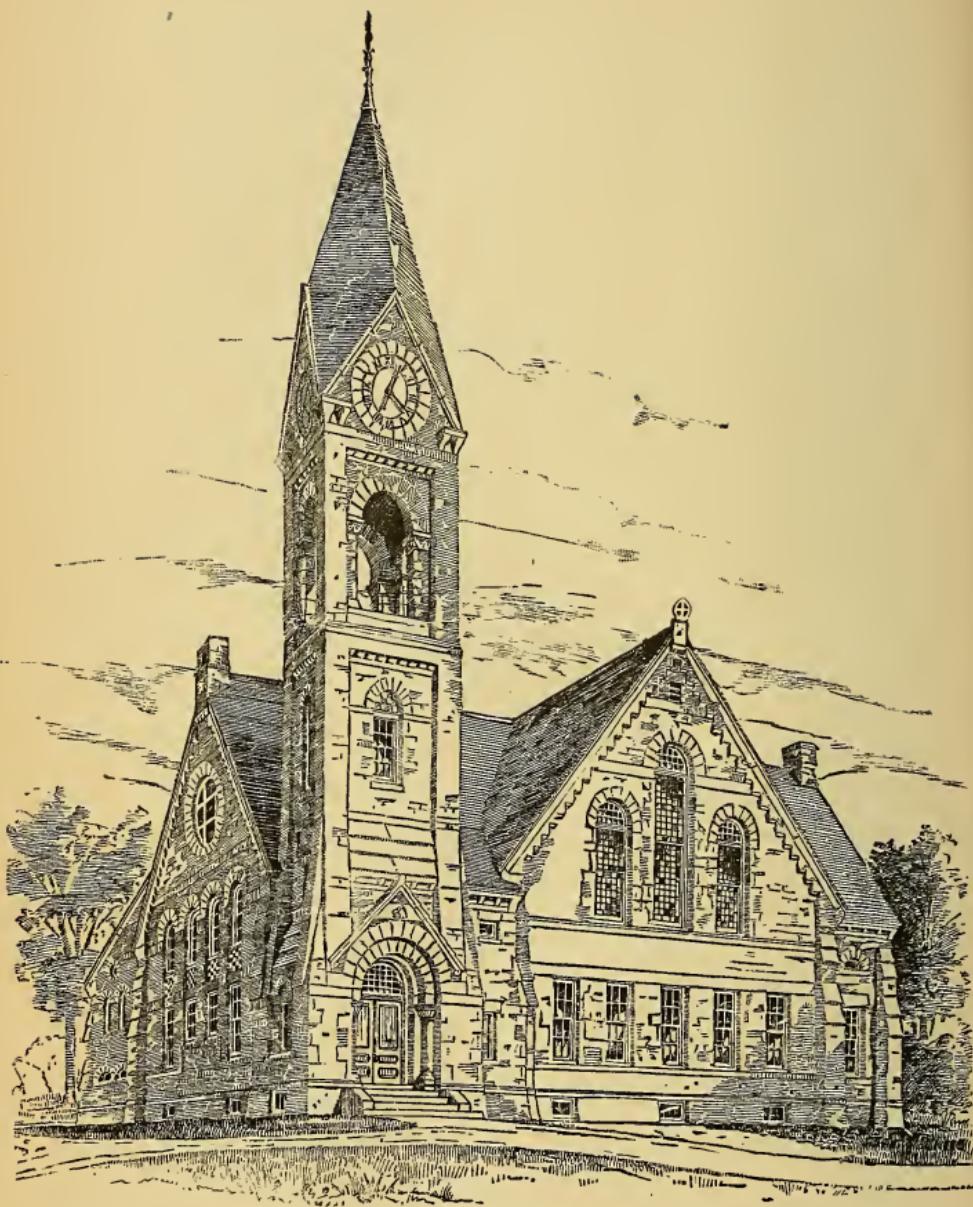
JANUARY, 1886.

BOSTON :

WRIGHT & POTTER PRINTING CO., STATE PRINTERS,

18 POST OFFICE SQUARE.

1886.



NEW STONE CHAPEL AND LIBRARY BUILDING.

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Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Jan. 15, 1886.

To His Excellency GEO. D. ROBINSON.

SIR:—Herewith I have the honor to present to your Excellency and the Honorable Council the Twenty-third Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,

Your obedient servant,

JAMES C. GREENOUGH,
President Massachusetts Agricultural College.

CONTENTS.

	PAGE
REPORT OF TRUSTEES,	3
Introductory,	7
Objects of the College,	7-9
Buildings,	10
College Farm,	11, 12
Scholarships,	13
Immediate Needs of the College,	13
Concluding Remarks,	13, 14
 Department of Practical Agriculture,	 15-19
Botanical Department,	20-22
Chemical Department,	23, 24
Mathematical Department,	25, 26
Department of Anatomy and Physiology,	27
Military Department,	28-32
Treasurer's Report,	33
 CATALOGUE AND CIRCULAR,	 35, 36
Faculty and Undergraduates,	37-42
Course of Study, etc.,	43-53
Catalogue of Graduates and Employments,	54-62

**ANNUAL REPORT
OF THE
TRUSTEES
OF
MASSACHUSETTS AGRICULTURAL COLLEGE.**

To His Excellency the Governor and the Honorable Council:

In the history of the college, the year that has closed must be regarded as a year of progress. The laboratory building has been remodelled and repaired, a very cheerful and convenient dormitory has been planned and will soon be finished, and in a separate wing rooms long needed for instruction are being provided; the new chapel and library building is nearly ready for use; over a thousand volumes have been added to the library; a considerable addition has been made to the scientific apparatus; the productiveness of the farm has been increased; the Durfee Plant House has been repaired and painted inside and out, and furnished with new heating apparatus,—and, more than all these, the college has effectively aided a good number of students in fitting themselves for the duties of life.

OBJECTS OF THE COLLEGE.

The need of colleges better adapted to the education of those who are to engage in the more active pursuits of life, the need of technical training for those who are to engage in agriculture, and the need of men of military training, led to the founding by the United States, with the co-operation of the legislatures of the several States, of this and other similar

colleges. The objects for which the United States made the appropriation for founding and maintaining this college are, as stated in the original bill, "The endowment, support and maintenance of at least one college where the leading object shall be, without excluding scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." In accordance with this act, a four-years' course of study was arranged at the time the college was founded, which from time to time has been somewhat modified as the facilities for instruction have been furnished and as the several departments of science have advanced.

The general purpose of the institution is in good degree indicated by its name. It is a college. It is an agricultural college. As a college, its purpose is the physical, intellectual and moral development of its students. The subjects included in the course are some of the means to be used in securing this end. These subjects are naturally divided into two groups.

The first group includes those subjects that are adapted to give a knowledge of external nature.

In the second group are included those subjects that are adapted to give a knowledge of man.

The first group includes mineralogy and geology, and other subjects pertaining to the inorganic kingdom; physics, pertaining to the motion of masses of matter; chemistry, pertaining to the molecular changes of matter; botany and kindred subjects, pertaining to the vegetable world; zoölogy and kindred subjects, pertaining to the animal world.

In the second group are included the studies of language, mental and moral philosophy, history, political economy, civil government and kindred studies.

A third group would seem to be needed, to make any complete course of study; viz., those studies that pertain to a knowledge of God. But the subjects pertaining to nature and to man, if properly taught, lead to a knowledge of God.

In securing the development of the student as a man, it is

needful that in the college course he gain sufficient knowledge and discipline to enable him, after leaving college, to advance successfully in any one of the departments named. Whatever a course of study includes, its value depends upon its adaptation to develop the powers of the student, and its service as a basis of future progress. Progressive manhood should be the object of every college.

The distinctive feature of this college is that it is an agricultural college. Hence, so far as is practicable, the sciences here taught are taught in their relations to agriculture. The great variety of employments included under the term agriculture, and the rapid advances made in the useful application of the sciences, must render the course both broad and practical. Any attempt to confine the work of the college within narrow technical limits, is contrary to the spirit and intent of the founders, is not in accord with the vast interests it subserves, and is unworthy of those to-day engaged in one of the most honorable and useful employments. There are two classes of persons making demands upon our higher institutions of learning, and especially, I may say, upon an agricultural college.

Those of one class demand that these institutions shall develop the student's powers without reference to any future employment. They demand the culture of the man.

Those of the other class demand practical business results from an education, and judge of the value of a course by the business skill gained in some one employment, and the pecuniary returns it enables one to secure. The demand of each class is reasonable. Knowledge and mental power are of paramount importance, independent of their business applications; and yet the daily needs of our physical and social life require that we use our knowledge for practical ends. While the agricultural college aims to secure the education of its students in the highest and best sense of the term, it also furnishes opportunities to prepare for a useful employment. It does not aim to give mere theoretical knowledge. It aims to teach the sciences in their practical application to at least one employment, and that the fundamental employment of our own and of every other people.

BUILDINGS.

The old chapel building has been changed in its interior construction, and renovated, so that it now contains a lecture-room, a room for drawing, the mathematical recitation-room, the philosophical apparatus room, the chemical lecture-room, the chemical laboratory and various work-rooms. The appropriation of \$2,000, made by the legislature of last year, was not sufficient to do all that should be done, but the improvements made will greatly aid our scientific work.

The brick building, partly on the site of the old south dormitory building, is roofed, plastered, and nearly ready for the finish. This building is composed of two wings, joined so as to form a right angle. The dormitory wing, more than 151 feet in length, fronts toward the south, giving a south room for a study-room to every student who shall occupy the building. The bedrooms in the rear of the study-rooms are of good size, and arranged for ample light and ventilation. The building will accommodate forty-eight students when all the rooms are finished.

The lecture-room wing fronts the east, and has in its basement the steam-heating apparatus, the work-room and the agricultural implement room. All of the first floor is devoted to the work of the agricultural department. Here are one lecture-room, two smaller rooms, and a large room for an agricultural museum. In the second story are two rooms for the department of language and literature, and for other departments. A third room in this story will make an admirable room for our collections in natural history, and may also be used for lectures on mineralogy and geology.

The new chapel and library building, which has been delayed because of the erection of the tower, is nearly finished, and will soon be furnished. All the buildings should be connected with each other and with the walk on West Pleasant Street by concrete walks; for this purpose an appropriation of \$1,000 will be required. The college grounds should be provided with additional hydrants connected with the water supply of the town of Amherst. Hose and other necessary apparatus should be at hand to protect the build-

ings against loss by fire. An appropriation of \$1,000 will be required for this purpose.

COLLEGE FARM.

The real estate connected with the college may be considered under three heads :—

1. That occupied by the Massachusetts Experiment Station, for an account of which we would refer to the annual report of Dr. Goessmann, Director of the Station.
2. That part under the direction of the professor of botany and horticulture, for an account of which we refer to the accompanying annual report of Prof. S. T. Maynard.

3. That part lying west of the county road, or the farm proper. This is now estimated by the professor of agriculture to contain about 233 acres. Some seventy-five or eighty acres of this are now used as mowing and tillage. A large proportion of the land now enclosed as pasture has in former years been cultivated. In fact, whenever the department of practical agriculture shall adopt a system of rotation of crops, for which the improvements made on the farm during the last two years is a good preparation, the land now enclosed as pasture will be available, as well as that now used as mowing and tillage. The lowland in the pasture west of the college buildings was cleared, ditched and put in condition for plowing some years ago, under President Stockbridge. In the autumn of 1883 it was plowed, and in the spring of 1884 it was so seeded that during that season it yielded excellent pasturage. By the maintenance of a system of farming adapted to instruct the students as well as to improve the farm, this lowland, without much expense, can be made very productive land.

Credit is due to Mr. Wright, the farmer, for so managing the farm during the past two years as to double the quantity of hay produced; while the yield of corn the past year is estimated, from measurement in the ear, at upwards of twelve hundred bushels of shelled corn. It is a gratifying fact that the balance sheet at the close of this year is in favor of the farm. There is great need of a good corn-house for the farm, and of more shed room for the storage

of farm implements. The barn needs considerable repairing. Important changes should be made in it, and the buildings connected with it, that they may be more serviceable for instruction, and may better secure economy of labor. It is estimated that not less than twelve hundred dollars will be required for this purpose.

From the time the college was opened, the farm has been used as a means of instruction whenever the professor of agriculture wished so to use it. The present executive committee of the trustees and the president are disposed to aid the professor of agriculture in rendering the farm a more effective means of instruction. The area of the farm, diminished by the separation of the parts above named, makes its care by the professor of agriculture less onerous than in former years, while it may be made equally valuable for educational purposes. In fact, the history of the college furnishes abundant evidence that a much smaller farm would have been far more profitable in many ways. We herewith submit the financial statement for the year ending Dec. 31, 1885:—

	DR.	CR.
Cash paid out by Treasurer,	\$3,759 70	-
Cash received from sales,	-	\$4,152 85
Bills payable,	250 12	-
Bills receivable,	-	337 99
Increase in value of stock,	-	200 00
of tools and implements,	-	100 00
of crops on hand,	-	1,065 00
Balance,	1,846 02	-
	<hr/>	<hr/>
	\$5,855 84	\$5,855 84

From the above it will be seen that the cash balance in favor of the farm is \$393.15. Add to this the balance of bills in favor of the college, which are, for the most part, as good as cash within thirty days, and the balance in favor of the farm is \$481.02, while the total balance in favor of the farm is \$1,846.02.

SCHOLARSHIPS.

Of those who were examined to enter the college last September, twenty-nine were entitled to State scholarships. Twenty-five of these are enrolled in our classes. These students constitute the greater part of the Freshman class. As the examination papers written in the several senatorial districts are now mailed to the college, and there examined, the candidates for scholarships are now admitted on a uniform basis. The ability and earnestness of those who have received scholarships is gratifying. The plan by which scholarships are made available for every section of the State puts the college in close relations to the people of the State. Under this plan a far larger number of those young men for whom the college was intended can avail themselves of its benefits. The distribution of scholarships also tends to diffuse information concerning the college, and is leading to a better appreciation of its work.

IMMEDIATE NEEDS OF THE COLLEGE.

I. The re-enactment of the resolves of 1883, providing for an annual payment "to enable the trustees to provide for the students of said institution the theoretical and practical education required by its charter and the law of the United States relating thereto," and also providing free scholarships.

II. An appropriation of one thousand dollars, to connect the college buildings by suitable walks, and to connect said buildings by walks with the walk on the Amherst highway.

III. An appropriation of twelve hundred dollars, to improve the farm buildings, and put them in good repair.

IV. An appropriation of one thousand dollars, to make the changes and improvements in the Drill Hall advised by Lieut. Sage.

CONCLUDING REMARKS.

The earnestness and the success of the students in the several departments during the year have been worthy of much commendation. With the admirable rooms soon to be completed for the students, and the increased facilities

for instruction now furnished, the college, we believe, will deserve in larger degree the growing patronage which it enjoys. The faculty of the college has suffered but little change. Prof. Horace E. Stockbridge, Ph. D., resigned in April to accept an important position in the Imperial College of Agriculture, Japan. His place has been filled by the appointment of Charles Wellington, Ph. D., of the Class of '73. The detail of Victor H. Bridgman, First Lieutenant, Second Artillery, having expired, Geo. E. Sage, First Lieutenant, Fifth Artillery, has been detailed from the U. S. A. by the Secretary of War, as Professor of Military Science and Tactics.

DEPARTMENT OF PRACTICAL AGRICULTURE.

President JAMES C. GREENOUGH.

SIR :—The following report on the course of instruction in agriculture for the year 1885 is respectfully submitted.

Twelve of the Freshman class of last year, thirteen of the present Sophomore class, sixteen of the present Junior class and all of the Seniors have taken the course in agriculture.

The general plan of class-room instruction presented in outline in former reports has been followed this year with greater satisfaction, as nearly all of the students of the several classes were in their proper place in the course, so that the systematic relations and interdependence of its subdivisions were more readily recognized.

Throughout the entire course practical considerations and principles have been the leading subjects of discussion, and theories have only received a share of attention when they had a direct bearing upon the economies of farm practice.

The uniform attention of the students to the lectures in the several departments of the course, and the interest they have taken in the various topics presented, have been all that could be wished, notwithstanding the many defects in the means of illustration.

During the past term, for the first time in the history of the college, the department of agriculture has had a class-room under its exclusive control ; and although these temporary quarters have been crowded and inconvenient, the great advantages of this arrangement over former conditions have been manifest in all class exercises. The agricultural class-room and museum provided for in the new building will furnish better facilities for illustrating the several topics

embraced in the course, which will materially increase the efficiency and influence of the department.

In my report of last year, attention was called to the great

- importance of biology, in its latest developments, as a subdivision of agricultural science; and I afterwards made an estimate of the apparatus needed in this department, as a basis for legislative appropriations.

This estimate was intended to provide the necessary apparatus for the illustration of the class-room instruction in agriculture, and to furnish facilities for practical laboratory work in biology by a class of from twelve to fifteen students. A part of this apparatus has already been purchased and used during the past term, and experience shows that the original amount asked for is absolutely required to provide suitable appliances for biological work by the students now in the course in agriculture.

If all of the students in the college take the agricultural course, including biology in its relations to agriculture, several hundred dollars more than my original estimate will be needed to provide them all with facilities for work in the biological laboratory.

Instruction in biology has been given by lectures, in which the general principles of the science are discussed, especial prominence being given to subdivisions of the subject that have a direct relation to agricultural problems of practical interest; and the oral instruction is supplemented by laboratory practice, in which the student is required to make original investigations that serve to verify and fix in his mind the leading facts of the science. During the past term the senior class has been making good use of the new apparatus belonging to the department, in the study of microscopic organisms of particular interest to the farmer in the curing and management of dairy products, including the various processes of fermentation and putrefaction, and the specific forms which have been proved to be the causes of some of the most fatal diseases of plants and animals.

They have thus been made familiar with the general appearance and behavior of these minute organisms; and, by making drawings and measurements of the forms under observation, and cultivating them in appropriate media,

under known conditions, they are enabled to trace the life history and specific function of particular species, and determine their distinguishing characteristics which might otherwise escape attention. Original researches have already been begun by some of the students under my advice and supervision, which give promise of valuable results, in relation to the cause of epidemic abortion in cows; and work of this kind may be profitably extended to include the entire range of communicable diseases.

The training of students in the exact methods of investigation required in such studies, is not only of great value to them as an educational factor, but it gives them broader views of the rapidly extending relations of science to agriculture; and the experience gained in observing the influence of a change of conditions upon the vital activity of these lowest forms of life, is the best possible preparation for the intelligent consideration of the means of controlling or preventing the ravages of all communicable diseases.

The interest of the students in this work, the past term, is manifested in the requests made by almost every member of the class that they may be allowed to continue their laboratory work in biology as a special study, during the remainder of their college course. A number of special students have likewise made application for the practical course in biology during the next term.

From the great practical importance of the department of biological science, relating to the causes of communicable diseases, which has been developed within the past few years and is now attracting prominent attention, as a means of solving some of the most difficult problems of sanitary science, to say nothing of the relations of biology to other branches of rural economy,—it seems desirable that provision should be made for the prosecution of biological studies in a well-arranged laboratory, where the apparatus now belonging to the department can be used to the best advantage. A room in the new building should be assigned for this exclusive purpose, as satisfactory work in this direction cannot be carried on in a room used for other purposes; and it must be in immediate connection with the agricultural department, if

the students are to realize the greatest profit from their work under my supervision.

Among the means of illustration and instruction in an agricultural college, the farm should occupy a prominent and commanding position, and its management should be in harmony with the principles taught in the class-room. In its present condition and equipment, the farm must fail to serve its legitimate purpose as a part of the educational facilities of the college; and, in justice to my own department of instruction, it must be said that the professor of agriculture has not been consulted in regard to any detail of farm management, either directly or indirectly, for the past two years.

Of the 383 acres embraced in the college domain, it is estimated that about 150 acres is occupied by the horticultural and experimental departments, and by the college buildings and adjacent grounds and roads, leaving approximately about 233 acres in charge of the farm department.

The land available for cultivation on the farm is only 75 acres, or less than one-third of the area of the farm proper; and nearly one-half of this is in small and irregular plots, of from two to nine acres of the area properly included in the college grounds.

The best land on the farm is now practically a barren waste, which can only be made productive by thorough drainage; and this forms part of an enclosure of about 100 acres, which is used as a cattle range, some parts of which are in grass, that may be converted into a good pasture with a moderate expenditure of labor.

The south part of this enclosure, lying directly west of the college buildings, should be reclaimed by thorough drainage and brought under cultivation, as a matter of economy in providing a variety of work for the students, and distributing it throughout the season.

In the improvement of this tract, the students will have the opportunity for acquiring practical experience in laying tiles; and the subsequent management would serve to show that their labor in such permanent improvements is not unproductive.

The fences on the enclosed part of the farm should be

reconstructed and arranged so that the different fields may be made conveniently accessible.

The barn should be repaired and rearranged to provide better quarters for the live stock of different kinds, and to economize the expenditure of labor in its care and management.

The equipment of implements for the fields and farm buildings should include the latest and most complete apparatus for economizing labor in all departments of the work.

Several breeds of cattle, sheep and swine of the very best quality should be kept on the farm, so that the students may become familiar with the characteristics of the leading types, and their adaptation to particular purposes.

The farmers of the State would likewise be directly benefited by such a collection of pure-bred stock, as they could then conveniently make a comparison of the qualities of the different breeds under favorable conditions ; and the college farm would become a centre for the distribution of choice breeding stock to different parts of the State.

MANLY MILES.

BOTANIC DEPARTMENT.

President J. C. GREENOUGH.

SIR : — The following report upon the condition of the Botanic Department is respectfully submitted : —

The class-room work of instruction has been carried out the past year according to the college curriculum.

The field exercises have been much reduced in number and time, on account of the limited time the students have for such work, after attending the regular recitations and the military exercises, the want of proper equipment of tools, and the fact that the time of the instructor has been too much taken up in looking after the details of the trade department and the assigned class-room work.

In order to make the department more efficient, an assistant is needed who can take entire charge of the details of the work in the greenhouses, orchard, nursery and gardens.

The question whether a State institution should conduct business as a means of support is often discussed, and under the present circumstances is a difficult one to settle.

In an industrial institution, such as this was intended to be, all the branches of agriculture and horticulture must be practical ; and what is done in this line, aside from experimental and illustrative work, should be done with a view of a profit over and above the cost of production. While the transaction of business seems a necessity, it is found here, as in all other State institutions, that the conditions are such as led one of the ex-governors of Massachusetts to say that he could do more with seventy-five cents of his own money than he could with one dollar belonging to the State.

The amount of business done can be reduced very much, if a plan can be adopted to keep the land now under cultivation in a condition required to interest and instruct both

students and the public; and it would be a welcome relief to those obliged to carry on the work under such disadvantageous circumstances.

I would suggest that some of the above land be devoted to experiments in forestry, and that the original plan be carried out of making an arboretum on some of the land south-east from the president's house. Many very desirable trees and shrubs are already growing in our nursery, and others can be obtained by exchange and otherwise at a very small expense.

The crops the past season have generally been abundant, but owing to low prices the income from sales has been much less than last year.

The orchards, vineyard and small-fruit plantations are in a much improved condition, and a permanent income may now be expected from them without a great expense.

The stock of trees in the nursery is much increased in value, especially in the line of *fruit trees*, of which we can offer a fine stock.

The plants in the large greenhouses have now regained much of their former size and beauty, and require more time and labor to keep in good condition. The propagating pits are well stocked with bedding plants for spring trade and decoration, and with carnations and violets for cut flowers.

The old furnaces in the large houses have been replaced by two new ones, which are working well, and give more heat with a greater economy of fuel.

All the woodwork of both the greenhouses and propagating pits has received a thorough coat of paint, and is much improved in appearance.

An experimental plat in which to test the new varieties of fruits, and to furnish specimens of native grasses and other forage plants, has been laid out north-east of the new stable. In these plats have been planted over 40 new varieties of grapes; 15 new varieties of raspberries and blackberries; 6 new varieties of plums; 10 new varieties of cherries; 8 new varieties of apples; 60 new and standard varieties of strawberries; 10 new and standard varieties of peaches; also, 60 varieties of grasses and forage plants for illustration, and to supply herbarium specimens for students.

All the above have been provided with a large sheet-iron label, painted white, with the name distinctly printed upon each, as have also most of the trees and shrubs in the immediate vicinity of the plant-house and Botanic Museum.

It is hoped that another season we may provide similar labels for all the specimen trees upon the college grounds, so that visitors as well as students may be instructed and entertained.

The financial condition of the department is shown by the following statement:—

STATEMENT.

Dr.

To cash received for trees, plants, fruit, vegetables, etc.,	\$4,124 89
To cash collected by bursar for the above,	499 21
	<hr/>
	\$4,624 10

To the above should be added the following credits:—

To grading, seeding, etc., about the new stable,	15 00
To preparing and planting experimental plats,	65 00
To trees, plants, etc., for experimental plats,	125 00
To preparing labels for trees, plants, etc.,	75 00
To <i>estimated</i> cost of <i>extra labor</i> above that necessary to carry on the business, including care of specimen plants in the plant-house, decorating the grounds, taking care of walks and roads, and mowing the lawns about the plant-house and Botanic Museum, etc.,	500 00
To increased value of nursery stock,	250 00
To increased value of orchards, etc.,	250 00
To outstanding bills due,	365 64
Total income,	<hr/> \$6,269 74

Cr.

By bills paid by bursar,	\$5,276 06
By bills paid by Botanic Department,	<hr/> 245 77
Total expense,	5,521 83
Balance in favor of Botanic Department,	<hr/> \$747 91

S. T. MAYNARD.

CHEMICAL DEPARTMENT.

President JAMES C GREENOUGH.

SIR:—Instruction has been given in the chemical department during the past year to four classes, as follows:—

The Sophomore class has finished its first term in elementary chemistry, having studied chemical phenomena in general, and the properties and behavior of the metalloids. Next term it will study the chemistry of metals.

The Juniors have taken their second term in elementary chemistry,—*i. e.*, the chemistry of metals,—and a term in chemical geology or the study of the formation of arable soils, and next term enter the laboratory for practical work in chemical analysis.

The Senior class has had three terms of laboratory practice, having been required first to study the properties of the commonly occurring elements, both in the dry and humid way, and then to ascertain the qualitative composition of unknown substances, beginning with those of simple character and taking up gradually more complex mixtures, and finally analyzing substances of general and special interest in agricultural economy. In this connection the class have received lectures and have been examined upon the occurrence and composition of the fertilizing materials of our markets, and also upon the best methods in quantitative analysis. Next term this class will study organic chemistry, especially in relation to agricultural pursuits. It is suggested that during their last term in college the Seniors receive instruction in the domain of agricultural chemical industries,—*i. e.*, in the modes of manufacture of sugars, starch, oils, oil-cake, milling products, etc.,—and also to a farther extent than is elsewhere possible in the course, in that of fertilizers; such being eminently fitted to bring strikingly before

the student, at the moment of his leaving the more theoretical studies and entering into agricultural practice, the true bearing of the chemistry studied during the course upon a large series of important industries with which his future business will stand in intimate relation.

The graduates of last summer received instruction during the previous winter term in organic chemistry.

A number of resident graduates have studied quantitative analysis.

Instruction in the branches of mineralogy and geology having been placed for the time being, until further provision shall have been made for it, in the charge of this department, advantage is to be taken of the interval which exists in the regular chemical course, between the second terms of the Sophomore and Junior years. In those terms the elements of mineralogy will be considered; then the special character of minerals of importance in agriculture, the building of rocks, the general structure of the earth, the disintegration and breaking down of the rock masses in the formation of various soils, the significance of the presence or absence of various mineral substances in a soil, will be considered in order, and foundation will thus be made for a rational treatment of the doctrine of fertilization.

The assistantship, established in this department early in 1884, became vacant last spring through the resignation of Prof. H. E. Stockbridge, who accepted a call from Japan. Engagement was made with Prof. C. Wellington, who entered upon duty at the beginning of the past term.

Of the fifty-five hundred dollars appropriated at the last session of the General Court for the purchase of scientific apparatus, fifteen hundred were apportioned to this department. Of this amount about one-third has actually been disbursed in the purchase of gas apparatus from the Massachusetts Experiment Station, and the remainder will soon be expended for much-needed apparatus and fixtures.

Very respectfully,

C. A. GOESSMANN.

MATHEMATICAL DEPARTMENT.

President J. C. GREENOUGH.

SIR :— During the past year many improvements have been made in this department. The lecture-room, that has been heretofore a source of inconvenience, is now converted into a suitable and convenient apartment. The physical cabinet has received additional room ; new cases have been furnished, and heating facilities increased. A small work-room, with a compartment for electric batteries, has also been suitably fitted up.

The money appropriated by the last legislature will, when expended, furnish apparatus sufficient for illustrating the laws and phenomena in the department of physics. We shall be furnished with new and valuable instruments, for use in mechanics and civil engineering. Arrangements have already been made for purchasing the necessary apparatus. But it should be borne in mind that new applications of principles are constantly being discovered, and new instruments are continually devised and invented for illustration ; so that it becomes necessary from time to time to furnish supplementary apparatus.

Hence, a small sum of money should be expended yearly, in order that the college may keep abreast of the scientific progress of the age. The method of instruction has been, in the main, similar to that of the preceding year. The endeavor has always been to use the latest and most improved text-books, and to present each subject under discussion in as clear and practical a manner as possible. It

seems proper to urge again the advisability of raising the standard for admission. The student should have completed algebra, or thoroughly mastered two or three books of geometry, before entering college. This preparation would better enable him to seize and comprehend at once the more difficult subjects that at first present themselves.

Respectfully submitted,

C. D. WARNER.

ANATOMY AND PHYSIOLOGY.

President JAMES C. GREENOUGH.

SIR:—I have the honor to submit the following report:—

During the past year the work of this department has been conducted mainly upon the plan outlined in the last annual report.

Instruction has been given to the Sophomore class in human anatomy (descriptive and microscopic) and physiology, five hours each week during the second term. In addition to the regular course, a special one during this term was given to the Senior class, three hours each week.

The department is now fairly well equipped with books for reference and consultation. During the year several of the more recent standard works on human anatomy, histology, physiology (including physiological chemistry and physiological physics) and comparative zoology were added to the library.

We are sadly deficient in apparatus, and in chemical and physical appliances necessary for purposes of illustration and practical work. A complete set of diagrams or charts, illustrating the anatomy of the human body, are very much needed, as are also a set of carefully mounted microscopic sections, without which it is impossible to teach animal histology intelligently. Very few, if any, of the alcoholic specimens belonging to the college are available for study in the lecture-room. These wants are at present supplied from the private collections of the instructor.

It is intended that the instruction in this department shall form a suitable basis for the subsequent instruction in comparative zoology and veterinary science.

F. TUCKERMAN.

MILITARY DEPARTMENT.

JAMES C. GREENOUGH,

President of the Massachusetts Agricultural Society.

SIR: — I have the honor to submit to you the following report, which will necessarily be brief, as I have been connected with the college only two months.

I am fortunate in succeeding an officer of the marked ability displayed by Lieut. Bridgman in the administration of the affairs of the corps, which I find in a most satisfactory condition.

Since taking charge of this department, I have occupied myself with such drills and exercises as would give me a more intimate acquaintance with the individuals of the corps, with the view of observing the effect of the military exercises upon them. There can be no doubt in the mind of any close observer that every member of this corps has been vastly improved by his military training. They are strong, sturdy, well set-up young men, who in after life will find themselves well repaid for the short time spent in uniform.

As yet, I have had no opportunity of meeting the two higher classes, as their course of study had been marked out before I arrived; but I hope that the course of instruction for the winter term will be so arranged that the Seniors will have at least two hours each week to devote to the study of the following subjects: Ordnance and gunnery, constitutional and military law, campaigns and battles, and an elementary course in strategy and engineering. The government expects that the graduates of this college will be able, in time of public need, to take positions as company and field

officers in State regiments that may suddenly be called into the field; and, in order to fit them for these positions, the above studies are absolutely necessary.

In cases of emergency, it is the officers that are required by the State; and if none are found already fitted to take command, they must be educated in the field with the loss of life, time and money, of which our late civil war furnishes a conspicuous example.

I desire also to call your attention to the necessity of heating the drill hall. Under ordinary circumstances, the exercise given by the drill is sufficient to keep the cadets warm; but the most of the drills that occur in winter are of such a character (bayonet and sabre) that it is impossible to keep comfortably warm.

The drill hall can be ceiled with matched spruce lumber, for five hundred dollars, which would greatly improve the appearance and increase the usefulness of the building. Then, if properly heated, it would be all that is required for the purpose.

In this connection I would urge the importance of adding to the drill hall a gymnasium, which I believe is an important feature in college education. Great interest is taken in this matter by the students, who show a disposition to raise money for this purpose themselves; but I think it better to refer it to you, hoping you will give your approval and assistance in forwarding the undertaking. The frame of the building is well suited to the requirements of a gymnasium, and the necessary apparatus could be so arranged as not to interfere with the military exercises in any way.

The records of this office show that a continuous effort has been made to put the corps in camp at Framingham with the Massachusetts State militia. It is highly desirable that a certain amount of military instruction should be given in camp, and if it is found impracticable to do this, I would recommend that a sufficient amount of camp and garrison equipage be drawn from the Quartermaster-General of the U. S. Army to encamp the corps on the college grounds, for at least two weeks either in June or September. An insight into the life of a soldier could be given, and such

camp duties taught as would not interfere with the regular college course. This knowledge would be invaluable to the cadet should he ever be called into active service.

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

THEORY.

Fall term, Freshman year. One hour per week for the term. Recitations in Upton's Infantry Tactics. School of the soldier. School of the company. Skirmish drill.

Fall term, Sophomore year. One hour per week, half term. Recitations in U. S. Artillery tactics. School of the soldier. Sabre exercise. Manual of the piece.

PRACTICE.

All students (unless physically disqualified, and furnished with a surgeon's certificate to that effect) will be required to attend all military duties and exercises, those pursuing a special or partial course not being exempt so long as they remain at the college. By the commencement of the second term students are required to provide themselves with a full uniform, comprising coat, blouse, trousers, cap, white gloves, etc., all of which costs about thirty dollars. All students are expected to conduct themselves in a quiet, orderly, and gentlemanly manner. The routine of duty as practised at the Military Academy will be followed as closely as possible. To insure a proper sanitary condition of the college buildings, each Saturday the commandant makes a careful inspection of all rooms and college buildings, during which time all students in full uniform are required to be in their rooms, for the proper police of which they are held strictly accountable. At the beginning of each term, issues of such equipments as they will require are made to all students. They will be charged for all injury, loss, and any neglect of the same.

For practical instruction, the following public property is in the hands of the college authorities :—

One platoon light Napoleons (light twelve).

Seventy-five sabres and belts.

One hundred breech-loading rifles, calibre forty-five.

Several accurate target rifles.

Two eight-inch siege mortars, with complete equipments.

For practice firing, the United States furnishes blank cartridges for all guns, and ball cartridges for rifle practice, which is encouraged by the department.

Drills, amounting to about four hours a week, are as follows : —

Infantry : school of the soldier, company and battalion ; manual of arms and sword ; bayonet exercise, skirmish drill, target practice ; ceremonies.

Artillery : school of the soldier ; detachment and battery and sabre exercise ; battalion organization.

For instruction in infantry tactics, the cadets are organized in a battalion of two or more companies under the commandant. The commissioned officers of the corps are selected from those cadets who show the greatest aptitude for military duty and ability to impart the knowledge to others. All officers are in turn placed in command of the battalion, and are at all times liable to be called upon to perform staff and field duties. The commissioned officers are chosen from the Senior class, the sergeants from the Junior class, and the corporals from the Junior and Sophomore classes.

Commissioned Staff.

RICHARD F. DUNCAN, *First Lieutenant and Adjutant.*

DAVID F. CARPENTER, *First Lieutenant and Quartermaster.*

Non-commissioned Staff.

JAMES M. MARSH, *Sergeant Major.*

JOSEPH S. MARTIN, *Quartermaster Sergeant.*

Captains.

WINFIELD AYERS, Co. A. R. B. MACINTOSH, Co. B.

GEORGE S. STONE, Co. C.

Lieutenants.

WILLIAM H. ATKINS, Co. A. CHARLES W. CLAPP, Co. B.

CHARLES F. W. FELT, Co. C.

First Sergeants.

HERBERT J. WHITE, Co. A. KINGSBURY SANBORN, Co. B.
EDWARD W. BARRETT, Co. C.

Sergeants.

J. C. OSTERHOUT, Co. A.	T. F. B. MEEHAN, Co. B.
FRANK S. CLARKE, Co. A.	A. L. ALMEIDA, Co. C.
C. W. FISHERDICK, Co. B.	H. N. W. RIDEOUT, Co. C.

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E. F. RICHARDSON, Co. B.	F. A. DAVIS, Co. A.
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F. C. ALLEN, Co. C.	G. W. CUTLER, Co. C.

Very respectfully, your obedient servant,

GEO. E. SAGE,
First Lieutenant 5th Artillery.

Statement of Cash Receipts and Expenses of the Mass. Agricultural College for the Year ending Jan. 1, 1886.

	RECEIPTS.	PAYMENTS.
Cash in hands of treasurer, Jan. 1, 1885, . . .	\$239 99	-
Cash in hands of bursar, " " . . .	166 11	-
Botanic account,	4,873 38	\$5,275 06
Farm account,	4,152 85	3,759 70
Term bill account,	3,970 75	1,652 18
Expense account,	206 00	6,088 48
Boarding-house account,	1,171 43	2,372 76
Laboratory account,	416 16	470 27
Mary Robinson Fund account,	32 00	60 00
Farnsworth Prize account,	50 00	50 00
Grinnell Prize account,	30 00	65 00
Hills Fund account,	630 00	432 48
Whiting Street Fund account,	40 00	-
Salary account,	-	12,998 30
Insurance account,	500 00	369 99
President's House account,	-	480 07
Repairs of North College, etc., account,	-	104 59
State treasurer, scholarships appropriation,	10,000 00	-
State treasurer, income of endowment fund,	10,265 53	-
Interest account,— received on deposits in bank,	280 68	-
Cash on hand, Jan. 1, 1886,	-	2,396 00
	\$36,524 88	\$36,524 88

Insurance Account.

	RECEIPTS.	PAYMENTS.
Received insurance on building, minerals, etc.,	\$17,513 00	-
Paid to bursar, Mass. Agricultural College,	-	\$500 00
Balance on hand, Jan. 1, 1886,	-	17,013 00
	\$17,513 00	\$17,513 00

CATALOGUE

OF

TRUSTEES, OVERSEERS, FACULTY AND STUDENTS.

—
1885.

CALENDAR FOR 1886.

January 6, Wednesday, winter term begins, at 8.15 A. M.

March 26, Friday, winter term closes, at 10.30 A. M.

April 6, Tuesday, summer term begins, at 8.15 A. M.

June 20, Sunday, { Baccalaureate Sermon.
 Address before the Christian Union.

June 21, Monday, { Grinnell Prize Examination of Senior Class
 in Agriculture.
 Military Exercises.
 Farnsworth Prize Speaking.

June 22, Tuesday, { Meeting of the Alumni.
 Commencement Exercises.
 Alumni Dinner.
 President's Reception.

June 23, Wednesday, Examination for admission, at 9 A. M.

September 7, Tuesday, Examination for admission, at 9 A. M.

September 8, Wednesday, fall term begins, at 8.15 A. M.

December 17, Friday, fall term closes, at 10.30 A. M.

1887.

January 5, Wednesday, winter term begins, at 8.15 A.M.

March 25, Friday, winter term closes, at 10.30 A.M.

**TRUSTEES, OVERSEERS, FACULTY AND
STUDENTS.**

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*President.**College Pastor and Professor of Mental and Moral Science, Provisional Instructor in History and Political Economy.*LEVI STOCKBRIDGE,
*Honorary Professor of Agriculture.*HENRY H. GOODELL, M. A.,
*Professor of Modern Languages and English Literature.*CHARLES A. GOESSMANN, PH. D.,
*Professor of Chemistry.*SAMUEL T. MAYNARD, B. S.,
*Professor of Botany and Horticulture.*MANLY MILES, M. D.,
Professor of Agriculture.

CLARENCE D. WARNER, B. S.,
Professor of Mathematics and Physics.

CHARLES WELLINGTON, Ph. D.,
Associate Professor of Chemistry.

Professor of Comparative Anatomy and Veterinary Science.

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 U. S. A.,
Professor of Military Science and Tactics.

FREDERICK TUCKERMAN, M. D.,
Lecturer on Anatomy and Physiology.

JOHN M. CLARKE, M. A.,
Lecturer on Geology and Zoology.

FREDERICK E. RICE, D. V. S.
Lecturer on Veterinary Science and Practice.

Graduates of 1885.*

Allen, Edwin West (Boston Univ.), . . .	Amherst.
Almeida, Luciano José de (Boston Univ.), .	Bananal, São Paulo, Brazil.
Barber, George Holcomb (Boston Univ.), .	Glastonbury, Conn.
Browne, Charles William (Boston Univ.), .	Salem.
Goldthwait, Joel Ernest (Boston Univ.), .	Marblehead.
Howell, Hezekiah (Boston Univ.), . . .	Blooming Grove, N. Y.
Leary, Lewis Calvert (Boston Univ.), . .	Amherst.
Phelps, Charles Shepard (Boston Univ.), .	Florence.
Taylor, Isaac Newton, Jr. (Boston Univ.), .	Northampton.
Tekirian, Benoni (Boston Univ.), . . .	Yozgad, Turkey.
Carruth, Herbert Schaw ('75), . . .	Boston.
Total,	11

* The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue gives the names of such students as have been connected with the college during any portion of the year 1885.

Senior Class.

Atkins, William Holland,	.	.	.	.	Westfield.
Ayres, Winfield,	.	.	.	.	Oakham.
Barker, John King,	.	.	.	.	Three Rivers.
Carpenter, David Frederic,	.	.	.	.	Millington.
Clapp, Charles Wellington,	.	.	.	.	Montague.
Duncan, Richard Francis,	.	.	.	.	Williamstown.
Eaton, William Alfred,	.	.	.	.	Piermont-on-Hudson, N. Y.
Feit, Charles Frederic Wilson,	.	.	.	.	Northborough.
Mackintosh, Richards Bryant,	.	.	.	.	Dedham.
Sanborn, Kingsbury,	.	.	.	.	Lawrence.
Stone, George Edward,	.	.	.	.	Spencer.
Stone, George Sawyer,	.	.	.	.	Otter River.
Wheeler, George Waterbury,	.	.	.	.	Deposit, N. Y.
Total,	.	.	.	.	13

Junior Class.

Allen, Frederick Cunningham,	.	.	.	.	West Newton.
Almeida, Augusto Luis de,	.	.	.	.	Bananal, São Paulo, Brazil.
Ateshian, Osgan Hagope,	.	.	.	.	Sivas, Turkey.
Ball, William Monroe,	.	.	.	.	Amherst.
Barrett, Edward William,	.	.	.	.	Milford.
Brown, Frederick Willard,	.	.	.	.	West Medford.
Caldwell, William Hutson,	.	.	.	.	Peterborough, N. H.
Carpenter, Frank Berton,	.	.	.	.	Leyden.
Chapin, Clinton Gerdine,	.	.	.	.	Chicopee.
Chase, William Edward,	.	.	.	.	Warwick.
Clarke, Frank Scripture,	.	.	.	.	Lowell.
Davis, Fred Augustus,	.	.	.	.	Lynn.
Fisherwick, Cyrus Webster,	.	.	.	.	Monson.
Fowler, Fred Homer,	.	.	.	.	North Hadley.
Hathaway, Bradford Oakman,	.	.	.	.	New Bedford.
Howe, Clinton Samuel,	.	.	.	.	Marlborough.
Kinney, Arno Lewis,	.	.	.	.	Lowell.
Long, Stephen Henry,	.	.	.	.	East Shelburne.
Marsh, James Morrill,	.	.	.	.	Lynn.
Marshall, Charles Leander,	.	.	.	.	Lowell.
Martin, Joseph,	.	.	.	.	Marblehead.
Meehan, Thomas Francis Benedict,	.	.	.	.	Boston.
Osterhout, Jeremiah Clark,	.	.	.	.	Lowell.
Paine, Ansel Wass,	.	.	.	.	Boston.
Rice, Thomas, second,	.	.	.	.	Shrewsbury.
Rideout, Henry Norman Weymouth,	.	.	.	.	Quincy.
Shaughnessy, John Joseph,	.	.	.	.	Stow.
Tolman, William Nichols,	.	.	.	.	Concord.
Torelly, Firmino da Silva,	.	.	.	.	Rio Grande do Sul, Brazil.
White, Herbert Judson,	.	.	.	.	Wakefield.
Total,	.	.	.	.	30

Sophomore Class.

Total, 24

Freshman Class.

Adams, George Albert,	.	.	.	.	Winchendon.
Alger, George Ward,	.	.	.	.	West Bridgewater.
Alger, Isaac, Jr.	.	.	.	.	Attleborough.
Blair, James Roswell,	.	.	.	.	Warren.
Bliss, Clinton Edwin,	.	.	.	.	Attleborough.
Bliss, Herbert Charles,	.	.	.	.	Attleborough.
Brooks, Frederick Kimball,	.	.	.	.	Haverhill.
Colcord, Wallace Rodman,,	.	.	.	.	Dover.
Copeland, Arthur Davis,	.	.	.	.	Campello.
Crocker, Charles Stoughton,	.	.	.	.	Sunderland.
Davis, Franklin Ware,	.	.	.	.	Tamworth, N. H.
Hartwell, Burt Laws,	.	.	.	.	Littleton.
Holt, Jonathan Edward,	.	.	.	.	Andover.
Hubbard, Dwight Lauson,	.	.	.	.	Amherst.
Huse, Frederick Robinson,,	.	.	.	.	Winchester.
Hutchings, James Tyler,	.	.	.	.	Amherst.
Kellogg, William Adams,	.	.	.	.	North Amherst.
Lumbard, Joseph Edward,	.	.	.	.	Boston.

Miles, Arthur Lincoln,	.	.	.	.	Rutland.
Mishima, Yataro,	.	.	.	.	Tokio, Japan.
Moore, Robert Bostwick,	.	.	.	.	Framingham.
Okami, Yoshiji,	.	.	.	.	Tokio, Japan.
Parsons, Wilfred Atherton,	.	.	.	.	Southampton.
Sellew, Robert Pease,	.	.	.	.	East Longmeadow.
Smith, James Robert,	.	.	.	.	Walpole.
Sprague, William Arnöld,	.	.	.	.	Chepachet, R. I.
Taylor, Fred Leon,	.	.	.	.	North Amherst.
Waite, Herbert Harold,	.	.	.	.	Belchertown.
Wells, Charles Otis,	.	.	.	.	Hatfield.
Wentworth, Elihu Francis,	.	.	.	.	Canton.
White, Louis Allis,	.	.	.	.	Whately.
Whitney, Charles Albion,	.	.	.	.	Upton.
Total,	.	.	.	.

39

Resident Graduates.

Allen, B.S., Edwin West (Boston Univ.), .	Amherst.
Jaqueth, Isaac Samuel,	Amherst.
Kingman, B.S., Morris Bird,	Amherst.
Lindsey, B.S., Joseph Bridgeo (Boston Univ.),	Marblehead.
Nourse, B.S., David Oliver (Boston Univ.),	Bolton.
Phelps, B.S., Charles Shepard (Boston Univ.),	Florence.
Preston, B.S., Charles Henry (Boston Univ.),	Danvers.
Smith, B.S., Llewellyn,	Amherst.
Stone, B.S., Winthrop Ellsworth, . . .	Amherst.
Wheeler, George Waterbury,	Deposit, N. Y.
Wheeler, B.S., Homer Jay (Boston Univ.),	Bolton.

11

Summary.

COURSE OF STUDY AND TRAINING.

Freshman Year.

Fall Term.

ALGEBRA. — Wells' University Algebra.

BOTANY. — Structural Botany and the study of the functions of vegetable organisms.

FRENCH. — Principles and applications of grammar, pronunciation, oral and written exercises in translating from French into English and from English into French. Whitney's French Grammar. Readings from French authors.

HISTORY. — Ancient Greece and Rome, with reference to modern institutions. Modes of life and institutions of the Middle Ages with reference to the evolution of our political and other institutions.

Winter Term.

PLANE GEOMETRY AND THEORY OF EQUATIONS. — Wentworth's Geometry.

FREE-HAND DRAWING. — White's Series. Object Drawing and Original work.

FRENCH. — Translations, oral and written, from French into English.

HISTORY. — Beginnings of Modern History. Period of the Protestant Revolution. Thirty Years' War. Development of the nationalities of Western Europe. Progress of civil freedom.

ZOOLOGY AND ENTOMOLOGY. — General classification of animals. Insects injurious to vegetation. Orton's Zoology. Packard's Guide to Study of Insects.

Summer Term.

SOLID GEOMETRY AND CONIC SECTIONS. — Wentworth's Geometry.

BOTANY. — Analysis. Systems of classification. Practical exercises in classification and in collecting and arranging herbaria. Bessey's Botany. Gray's Manual.

FRENCH. — Translation of some scientific or historic work, as Puydt Les Plantes de Serre.

AGRICULTURE. — History of Domestic Animals. Characteristics and development of different breeds, illustrated by stock of the college farm and by stereopticon views of photo-portraits of typical forms. Class work on the farm during the term as directed.

Sophomore Year.*Fall Term.*

PLANE TRIGONOMETRY — Griffiu's Conic Sections. Wells's Trigonometry.

BOTANY. — Systematic Botany. Special study of useful and common plants. Bessey's Botany. How Plants Grow, by Johnson.

CHEMISTRY. — Elementary Inorganic Chemistry. Instruction given by lectures and text-book, and all important facts experimentally demonstrated. Introduction to the Study of Chemistry. Nomenclature. Symbols. Atomic Weights. Water and its constituents. Air and its constituents. Quantivalence. Radicals. Stoichiometry. Acids. Bases. Salts. Consecutive consideration of the non-metallic elements.

GERMAN. — Whitney's Grammar. Boisen's Reader. Oral and written exercises.

AGRICULTURE. — Stock breeding; laws of heredity; causes of variation; in-and-in breeding and cross-breeding; form of animals as an index of qualities; selection and care of animals; feeding for meat production; the dairy and its work. Class work on the farm during the term as directed.

Winter Term

MENSURATION AND ASTRONOMY. — Measurement of lines, angles, surfaces, solids and volumes. Wells's Trigonometry.

CHEMISTRY. — Metals of the alkalies. Metals of the alkaline earths. Metals of each succeeding group considered distinctively. Each element and subject is first treated from a theoretical standpoint, and then the agricultural and technical significance of the facts learned are considered.

MECHANICAL DRAWING. — White's Series. Use of instruments. Building plains, specifications, etc.

GERMAN. — Eichendorff. Aus dem Leben eines Taugenichts. Oral and written exercises.

AGRICULTURE. — History of Agriculture, with particular reference to the development of systems and rules of practice. Pioneer farming, its methods and results. Mixed husbandry, — general principles and their special applications; cereals, forage crops, pastures and meadows. Drainage, general principles; different kinds of drains; laying out and construction of drains; improved methods of laying tile drains.

Summer Term.

CIVIL ENGINEERING AND ROAD MAKING. — Practical work with instruments in measuring heights and distances. Plane and topographical surveying, levelling, construction of railroad curves, embankments and excavations, drainage, etc. Davies' Surveying.

GERMAN.—Rau. Die Grundlage der Modernen Chemie. Oral and written exercises.

HORTICULTURE.—Cultivation and propagation of fruits. Lectures, with oral and written abstracts.

MINERALOGY.—Elements. Crystallography. Minerals of general interest and of special agricultural importance. Demonstration of functions of minerals in connection with soils. Practical work.

Junior Year.

Fall Term.

MECHANICS.—Lectures. Oral and written abstracts. Dana's Mechanics.

HORTICULTURE.—Market gardening and floriculture.

GEOLOGY.—Structural and chemical. History of the formation of the earth's crust. Formation of rocks from minerals. Classification of rocks according to their practical significance. Weathering and breaking down of rocks. Formation of agricultural soils. Varieties of soils. Characteristics and value of the same. Demonstrations and practical work.

RHETORIC.

Winter Term.

PHYSICS.—Atkinson's Ganot's Physics, new edition.

CHEMISTRY.—Instruction in the laboratory, with recitations. Blow-pipe analysis, with the determination of the characteristics of the more common metals and minerals. Determination of unknown substances. Humid analysis. Determination of characteristics of all the commonly occurring elements. Determination of bases and acids in known compounds.

AGRICULTURE.—Soils; farm implements; manures; rotation of crops; methods of agricultural improvement.

VETERINARY SCIENCE.—Lectures.

Summer Term.

CHEMISTRY.—Determination of qualitative composition of unknown substances. Analysis of fertilizers, of soils, and of agricultural and technical raw products.

HORTICULTURE.—Forestry and landscape gardening. Methods of propagation and cultivation of forest trees. Study of trees and plants most desirable for land decoration, with principles and rules of arrangement. Lectures, with oral and written abstracts. Hough's Elements of Forestry.

ANALYTICAL GEOMETRY.

METEOROLOGY.

ANATOMY AND PHYSIOLOGY.—Descriptive anatomy by means of skeletons, elastic models, fresh specimens, dissection, diagrams and charts. Lectures and discussion of topics. Microscopic anatomy. Chemical analysis.

Senior Year.*Fall Term.*

CHEMISTRY. — Analysis of prominent products of chemical industry.
Special lectures upon the same.

MENTAL SCIENCE. — Outline by inductive teaching, and by lectures.
Study of topics aided by Porter, Cousin, Hamilton, etc. Oral
recitations by topics and written abstracts. History of philosophy. Lectures.

BIOLOGY. — Its relations to agriculture. Laws of growth and development; relations of living organisms to farm practice; communicable diseases of plants and animals, illustrated by laboratory practice and experiments.

Winter Term.

CHEMISTRY. — Organic chemistry with reference to applications in agriculture and other industries.

POLITICAL ECONOMY. — Treatment of the subject by lectures, discussions and abstracts. Laughlin's Mill's Political Economy. Perry's, Newcomb's.

PRINCIPLES OF LAW. — Lectures.

ENGLISH LITERATURE. — Lectures on the early history of the English nation, and formation of the language. Study of the early literature.

Summer Term.

MORAL SCIENCE. — Outline of principles by inductive teaching and by lectures. Discussions. Recitations by topics and by abstracts. Philosophic Basis of Theism, by Harris. Hopkins' Law of Love.

CONSTITUTIONAL HISTORY. — Origin and development of the English Constitution. Colonial governments. Government of the United States. History of political parties. Development of popular governments in Europe during the present century.

ENGLISH LITERATURE. — Study of Shakespeare. Lectures on the historic epochs in connection with the text-book.

AGRICULTURE. — Principles of farm economy; systems of farm practice; buildings, plans and construction; applications of sanitary principles; farm machinery. Review and discussion of the relations of the several topics of the course.

In all studies, students are to be trained to accurate and ready oral and written expression, and to use drawing as language. Military tactics and military drill, as ordered, throughout the course. Weekly exercises in compositions and declamations throughout the course. The instruction in agriculture and horticulture is both theoretical and practical. Instruction in the field and manual training is given whenever such instruction and training will conduce to the progress of the student. Students are allowed to work for wages during such leisure hours as are at their command. A limited amount of work has been found to be beneficial, but work that withdraws the energy of the student from his studies is unprofitable to him. Students sometimes earn from fifty to one hundred dollars per annum.

ADMISSION.

Candidates for admission to the Freshman Class are examined orally and in writing, upon the following subjects: English Grammar, Geography, Arithmetic, Algebra to quadratic equations, the History of the United States, and the Metric System.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the college until he is fifteen years of age. Every applicant is required to furnish a certificate of good character from his late pastor or teacher. Candidates are requested to furnish the Examining Committee with their standing in the schools they have last attended. The previous rank of the candidate will be considered in admitting him.

GRADUATION.

Those who complete the course receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the college may also, on application, become members of Boston University, and, upon graduation, receive its diplomas in addition to that of the college, thereby becoming entitled to all the privileges of the alumni.

POST-GRADUATE COURSES.

Graduates of colleges and scientific schools may pursue their studies under Professor Goessmann in chemistry, under Professor Tuckerman in histology and anatomy, and under other members of the Faculty in their several departments.

EXPENSES.

Tuition in advance.

Fall term,	. . . . .	\$30 00
Spring term,	. . . . .	25 00
Summer term,	. . . . .	25 00
Room-rent, in advance, \$5.00 to \$10.00		\$80 00
per term,	. . . . .	15 00
*Board, \$3.50 to \$5.00 per week,	. . . . .	133 00
Washing, 30 to 50 cents per week,	. . . . .	11 40
Fuel, \$5.00 to \$15.00 per year,	. . . . .	5 00
Expense per year,	. . . . .	\$244 40
		\$384 00

To the above must be added thirty dollars to obtain a military suit, which is to be obtained during the first term of attendance at college, and is to be used in drill exercises during the four-years' course. Those who use the laboratory for practical chemistry will be charged ten dollars per term. Some expense will also be incurred for lights and for text-books. Students whose homes are within the State of Massachusetts, can in most cases obtain a scholarship by applying to the senator of the district in which they live. The outlay of money can be further reduced by work during leisure hours on the farm or in the botanic department. The opportunities for such work are more abundant during the Fall and Summer terms.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given. In the new south dormitory, the study-rooms are about fifteen by fourteen feet, with a recess seven feet four inches by three feet, and the bedrooms are eleven feet two inches by eight feet five inches. In the north dormitory the corner rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet; while the inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet.

THE ROBINSON SCHOLARSHIP.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson of Medfield, is assigned by the Faculty to such indigent student as they may deem most worthy.

* Several students, during most of the year, have formed a club and furnished themselves with board for about two dollars and fifty cents per week.

CONGRESSIONAL SCHOLARSHIPS.

The trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter college with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture.

STATE SCHOLARSHIPS.

The legislature of 1883 passed the following Resolve in favor of the Massachusetts Agricultural College:—

Resolved, That there shall be paid annually, for the term of four years, from the treasury of the Commonwealth to the treasurer of the Massachusetts Agricultural College, the sum of ten thousand dollars, to enable the trustees of said college to provide, for the students of said institution, the theoretical and practical education required by its charter and the law of the United States relating thereto.

Resolved, That annually for the term of four years, eighty free scholarships be and hereby are established at the Massachusetts Agricultural College, the same to be given by appointment to persons in this Commonwealth, after a competitive examination, under rules prescribed by the president of the college, at such time and place as the senator then in office from each district shall designate; and the said scholarships shall be assigned equally to each senatorial district; but if there shall be less than two successful applicants for scholarships from any senatorial district, such scholarships may be distributed by the president of the college equally among the other districts, as nearly as possible; but no applicant shall be entitled to a scholarship unless he shall pass an examination in accordance with the rules to be established as herein before provided.

In accordance with these resolves, any one desiring admission to the college can apply to the senator of his district for a scholarship.

LIBRARY.

The library now numbers forty-four hundred volumes. It has for the first time been made available to the general student, having been classified and catalogued according to the Dewey system. It is especially valuable as a library of reference, and every effort will be made to make it complete in the departments of agriculture, horticulture and botany.

APPARATUS AND COLLECTIONS.

The Class in Microscopy has the use of Tolles's best compound microscopes, with objectives from four inches to one-eighth of an inch in focal distance, and a variety of eye-pieces. Valuable apparatus has recently been purchased, for the use of the class in biology.

The State Cabinet of specimens, illustrating the geology and natural history of Massachusetts, has been removed from Boston to the college, and is of much value for purposes of instruction. This collection has from time to time received valuable additions.

The Knowlton Herbarium contains more than ten thousand species of named botanical specimens, besides a large number of duplicates. The Botanic Museum is supplied with many interesting and useful specimens of seeds, woods and fruit-models. There is also a set of diagrams illustrating structural and systematic botany, including about three thousand figures.

About Fifteen Hundred Species and Varieties of Plants are cultivated in the Durfee Plant-house, affording the student an invaluable opportunity of studying the most important types of the vegetable kingdom in their scientific and economic relations. Upon the grounds of the botanic department are cultivated a great variety of trees, shrubs and plants.

PRIZES.

FARNSWORTH RHETORICAL PRIZES.

Isaac D. Farnsworth, Esq., of Boston, has generously provided a fund of fifteen hundred dollars, the income of which is to be used as prizes, to be annually awarded, under the direction of the College Faculty, for excellence in declamation.

GRINNELL AGRICULTURAL PRIZES.

Hon. William Claffin of Boston has given the sum of one thousand dollars for the endowment of a first prize and a second prize, to be called the Grinnell Agricultural Prizes, in honor of George B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILLS BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1886, a prize of fifteen dollars is offered, and for the second best a prize of ten dollars; also a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the college farm.

THE CLARK PRIZE.

A prize of twenty-five dollars is offered to that member of the Sophomore class who passes the best examination in human anatomy and physiology. This prize is named in memory of Henry James Clark, the eminent biologist, who was the first professor of natural history at the college.

The prizes in June, 1885, were awarded as follows:—

Farnsworth Prizes. — 1. To Herbert Judson White; 2. To Osgan Hagope Ateshian, of the class of 1887. 1. To Warren Ayre; 2. To Francis Homer Foster, of the class of 1888.

Grinnell Prizes. — 1. To Benoni Tekirian; 2. To Charles Shepard Phelps, of the class of 1885.

Hills Prize to Hezekiah Howell, of the class of 1885.

Military Prizes. — 1. To Joel Ernest Goldthwait; 2. To Isaac Newton Taylor, Jr., of the class of 1885.

PHYSICAL CULTURE.

The military exercises in the open air, or in a spacious hall provided for the purpose, tend to promote health, erect form, and prompt, effective and graceful movement.

RELIGIOUS SERVICES.

Chapel exercises every morning at a quarter after eight o'clock. On Sundays the students attend morning service in the chapel, unless, by request of their parents, arrangements are made to attend church elsewhere. On Sabbath afternoons, or immediately following the morning service, there is opportunity for every student to study the Bible in a Bible Class.

The Young Men's Christian Association holds weekly meetings. The Sabbath evening services in churches about one mile distant, and meetings conducted by the students, furnish additional opportunities for religious culture.

CONDUCT.

Students are expected to co-operate with their instructors and with each other in promoting the welfare of the college, in order that every student may receive the best possible results of the course of study and training. Whenever it is evident that it is not for the good of a student to remain in the college, or that the welfare of the college requires that he should not remain, he will be dismissed.

LOCATION.

Amherst is on the New London & Northern R.R., connecting at Palmer with the Boston & Albany R.R., and at Miller's Falls with the Fitchburg R.R. A stage route of seven miles connects Amherst at Northampton with the Connecticut River R.R., and with the New Haven & Northampton R.R. The college buildings are on a healthful site commanding one of the finest views in New England. The large farm of three hundred and eighty-three acres, with its varied surface and native forests, gives the student the freedom and the quiet of a country home. The surrounding country is very helpful to the student of natural science. The location of the buildings prevents the student from the interruptions to study, incident on residence in a town or city, and helps to secure all the moral as well as the intellectual advantages of a college in the country.

COMMENCEMENT EXERCISES—1885.

BACCALAUREATE SERMON, by the PRESIDENT, Sunday Morning,
June 21.

ADDRESS BEFORE THE CHRISTIAN UNION, by PROF. A. P.
PEABODY, D. D., Preacher to Harvard University, Sunday Evening,
June 21.

GRADUATING EXERCISES, TUESDAY MORNING, JUNE 23.

PROGRAMME.

Music.

ISAAC NEWTON TAYLOR, NORTHAMPTON.
A Plea for Science in Agriculture.

EDWIN WEST ALLEN, AMHERST.
Success.

CHARLES SHEPARD PHELPS, FLORENCE.
The Progress of Science.

*LUCIANO JOSÉ DE ALMEIDA, BANANAL, SÃO PAULO, BRAZIL.
The Commercial Relations of Brazil and the United States.

BENONI TEKIRIAN, YOZGAD, TURKEY.
The Eastern Problem.

*CHARLES WILLIAM BROWNE, SALEM.
The Theory of Rotation.

Music.

LEWIS CALVERT LEARY, AMHERST.
The Scientific Method in Agriculture.

*HEZEKIAH HOWELL, BLOOMING GROVE, N. Y.
The Science of Forestry.

JOEL ERNEST GOLDTHWAIT, MARBLEHEAD.
The Power of Ideas.

GEORGE HOLCOMB BARBER, GLASTONBURY, Ct.
Law in Nature.

Music.

CONFERRING OF DEGREES by His Excellency, GEORGE D. ROBINSON.

Music.

PRAYER.

* Excused.

GRADUATES.

- Allen, Edwin W., '85, Amherst, resident graduate, Agricultural College.
- Allen, Francis S., '82, 135 West Forty-first Street, New York City, medical student.
- Allen, Gideon H., '71, Winfield, Cowley Co., Kansas, insurance agent.
- Almeida, Luciano José de, '85, Tres Barras, Province de São Paulo, Brazil, planter.
- Aplin, George T., '82, East Putney, Vt., farmer.
- Bagley, David A., '76.
- Bagley, Sydney C., '83, 35 Lynde Street, Boston, plumber.
- Baker, David E., '78, Newton Lower Falls, physician and surgeon.
- Barber, George H., '85, College of physicians and surgeons, New York City, student.
- Barrett, Joseph F., '75, 21 Beaver Street, New York City, Bowker Fertilizer Co., travelling salesman.
- Barri, John A., '75, Water Street and Fairfield Avenue, Bridgeport, Conn., Chittenden, Barri & Sanderson, National Fertilizer Co.
- Bassett, Andrew L., '71, Pier 36 East River, New York City, Bassett & Co., Transfer Co.
- Beach, Charles E., '82, Care of Beach & Co., Hartford, Conn., farmer.
- Bell, Burleigh C., '72, 16th and Howard Streets, San Francisco, Cal., druggist and chemist.
- Bellamy, John, '76, 657 Washington Street, Boston, Nichols, Bellamy & Co., hardware and cutlery.
- Benedict, John M., '74, 77 Bank Street, Waterbury, Conn., physician.
- Benson, David H., '77, North Weymouth, Bradley Fertilizer Co., analytical and consulting chemist and superintendent of chemical works.
- Bingham, Eugene P., '82, 13 Foster's Wharf, Boston, bleacher and manufacturer.

- Birnie, William P., '71, Springfield, Birnie Paper Co.
- Bishop, Edgar A., '83, Talladega, Ala., Talladega University, superintendent of farming department.
- Bishop, William H., '82, Tongaloo, Miss., Tongaloo University, superintendent of farming department.
- Blanchard, William H., '74, Westminster, Vt., farm laborer.
- Boutwell, Willie L., '78, Leverett, farmer.
- Bowker, William H., '71, 43 Chatham Street, Boston, president Bowker Fertilizer Co.
- Bowman, Charles A., '81, 7 Exchange Place, Boston, office of Aspinwall & Lincoln, civil engineer.
- Boynton, Charles E., '81, Haverhill, merchant.
- Bragg, Everett B., '75, Glidden & Curtis, Tremont Bank Building, Boston, chemist.
- Braune, Domingos H., '83, Nova Fribnrgo, Province of Rio de Janeiro, Brazil, planter.
- Brett, William F., '72, Brockton, R. H. White & Co., 518 Washington Street, Boston, clerk.
- Brewer, Charles, '77, P. O. Box 383, Syracuse, N. Y., florist.
- Brigham, Arthur A., '78, Marlborough, farmer.
- Brodt, Harry S., '82, Rawlins, Wyoming Territory, clerk.
- Brooks, William P., '75, Imperial College of Agriculture, Sapporo, Japan, professor of agriculture.
- Browne, Charles W., '85, Salem, farmer.
- Bunker, Madison, '75, Newton, veterinary surgeon.
- Callender, Thomas R., '75, Wellesley Hills, florist.
- Campbell, Frederick G., '75, Westminster West, Vt., farmer.
- Carr, Walter F., '81, 327 Hennepin Avenue, Minneapolis, Minn., Spalding & Carr, landscape architects and civil engineers.
- Carruth, Herbert S., '75 ('85), 340 Washington Street, Boston, W. B. Clarke & Carruth, booksellers and importers.
- Caswell, Lilley B., '71, Athol, civil engineer and farmer.
- Chandler, Edward P., '74, Fort Maginnis, Montana, Chandler, Chamberlain & Co., wool growers.
- Chandler, Everett S., '82, Beatrice, Gage Co., Nebraska, lawyer.
- Chapin, Henry E., '81, American Cultivator, Boston, associate editor.
- Chickering, Darius O., '76, Enfield, farmer.
- Choate, Edward C., '78, 153 Brattle Street, Cambridge.
- Clark, Atherton, '77, 131 Tremont Street, Boston, clerk.
- Clark, John W., '72, North Hadley, farmer.
- Clark, Xenos Y., '75 ('78), Pomona, Los Angeles Co., Cal., scientist.

- * Clay, Jabez W., '75.
Coburn, Charles F., '78, Lowell, teller Five Cents Savings Bank and editor "Daily Citizen."
Cooper, James W., Jr., '82, East Weymouth, drug clerk.
Cowles, Frank C., '72, city engineer's office, Worcester, civil engineer.
Cowles, Homer L., '71, Amherst, farmer.
† Curtis, Wolfred F., '74.
Cutter, John A., '82, 213 West Thirty-fourth Street, New York City, student at Albany Medical College.
Cutter, John C., '72, Imperial College of Agriculture, Sapporo, Japan, consulting physician Sapporo Ken Hospital and professor of physiology and comparative anatomy.
Damon, Samuel C., '82, Lancaster, farmer.
Deuel, Charles F., '76, Amherst, druggist.
Dickinson, Richard S., '79, Columbus, Neb., farmer.
Dodge, George R., '75, Brighton, Bowker Fertilizer Co., superintendent.
Dyer, Edward N., '72, Kohala, Hawaiian Islands, government superintendent of schools.
Easterbrook, Isaac H., '72, Arnold Mills, R. I., farmer.
Eldred, Frederick C., '73, 128 Chambers Street, New York City, New York manager of Montpelier Carriage Co.
Ellsworth, Emory A., '71, 164 High Street, Holyoke, architect and mechanical and civil engineer.
Fairfield, Frank H., '81, South Duxbury, Standard Fertilizer Co., chemist.
Fisher, Jabez F., '71, Fitchburg, freight cashier, Fitchburg Railroad Co.
Fiske, Edward R., '72, 625 Chestnut Street, Philadelphia, Penn., Follwell Bro. & Co., merchant.
Flagg, Charles O., '72, Abbott Run, R. I., farmer.
Flint, Charles L., Jr., '81, 7 Exchange Place, Boston, Dole & Flint, brokers.
† Floyd, Charles W., '82.
Foot, Sandford D., '78, 101 Chambers Street, New York City, Kearney, Foot & Co., file manufacturers.
Fowler, Alvan L., '80, address Westfield, cattle raiser, California.
Fuller, George E., '71.
Gladwin, Frederic E., '80, 38 California Street, San Francisco, Cal., assayer.

* Died Oct. 1, 1880, of pneumonia, at New York City.

† Died Nov. 8, 1878, of inflammation of the brain, at Westminster.

‡ Died Oct. 10, 1883, of consumption, at Dorchester.

- Goldthwait, Joel E., '85, Marblehead, Harvard Medical School, student.
- Goodale, David, '82, Marlborough, farmer.
- Green, Samuel B., '79, Newton Highlands, W. C. Strong's hot-houses, superintendent.
- Grover, Richard B., '72, Old South Church, Boston, associate pastor.
- Guild, George W. M., '76, 46 Chauncy Street, Boston.
- Hague, Henry, '75, South Worcester, St. Matthew's, rector.
- Hall, Josiah N., '78, Sterling, Weld Co., Col., physician.
- Harwood, Peter M., '75, Barre, farmer.
- Hashiguchi, Boonzo, '81, department of commerce and agriculture, Tokio, Japan, president Government Sugar Beet Co.
- *Hawley, Frank W., '71.
- Hawley, Joseph M., '76, Berlin, Wis., C. A. Mather & Co., banker.
- Herms, Charles, '84, O Bannon Station, Jefferson Co., Ky., stock-breeder.
- †Herrick, Frederick St. C., '71.
- Hevia, Alfred A., '83, 21 Cortlandt Street, New York City, Washington Life Insurance Co., agent.
- Hibbard, Joseph R., '77, Stoughton, Wis., farmer.
- Hillman, Charles D., '82, Fresno City, Cal., nursery man.
- Hills, Joseph L., '81, Beaufort, South Carolina, Phosphate Mining Co., limited, chemist.
- Hitchcock, Daniel G., '74, Warren, no business.
- Hobbs, John A., '74, Bloomington, Neb., farmer.
- Holland, Harry D., '84, Amherst, S. Holland & Son, clerk.
- Holman, Samuel M., Jr., '83, Attleborough, manufacturer.
- Holmes, Lemuel Le B., '72, Mattapoisett, lawyer.
- Howard, Joseph H., '82, Minnisela, Butte Co., Dak., cattle raiser.
- Howe, Charles S., '78, Akron, Ohio, Buchtel College, professor of mathematics.
- Howe, Elmer D., '81, Marlborough, farmer.
- Howe, George D., '82, North Hadley, clerk.
- Howe, Waldo V., '77, Newburyport, no business.
- Howell, Hezekiah, '85, Monroe, Orange Co., N. Y., farmer.
- Hubbard, Henry F., '78, 94 Front Street, New York City, with John H. Catherwood & Co.
- Hunt, John F., '78, Sunderland, market gardener.
- Jones, Elisha A., '84, Logan, Pa., superintendent of "Woodfield Farm."

* Died Oct. 28, 1883, of congestive apoplexy, at Belchertown.

† Died Jan. 19, 1884, at Lawrence.

- Kendall, Hiram, '76, Providence, R. I., Kendall Manufacturing Co., superintendent and chemist.
- Kimball, Francis E., '72, 15 Union Street, Worcester, E. W. Vail, book-keeper.
- Kingman, Morris B., '82, resident graduate, Agricultural College.
- Kinney, Burton A., '82, Portland, Me., Signal Corps, United States Army.
- Knapp, Walter H., '75, Newtonville, florist.
- Koch, Henry G. H., '78, Sixth Avenue and Twentieth Street, New York City, H. C. F. Koch & Son.
- Ladd, Thomas H., '76, care William Dadmun, Watertown, no business.
- Leary, Lewis C., '85, Cambridge, Harvard Divinity School, student.
- Lee, Lauren K., '75, Valley Springs, Dak., dealer in grain and flaxseed.
- Lee, William G., '80, Holyoke, office city engineer, draughtsman.
- Leland, Walter S., '73, Concord, State Prison, officer.
- Leonard, George, '71, Springfield, lawyer.
- Libby, Edgar H., '74, Greenfield, publisher, "American Garden."
- Lindsey, Joseph B., '83, Pawtucket, R. I., L. B. Darling, Fertilizer Co., chemical agent.
- Livermore, Russell W., '72, Pates, Robeson Co., North Carolina, merchant.
- Lovell, Charles O., '78, Northampton, photographer.
- Lyman, Asahel H., '73, Manistee, Mich., druggist.
- Lyman, Charles E., '78, Middlefield, Conn., farmer.
- *Lyman, Henry, '74.
- Lyman, Robert W., '71, Belchertown, lawyer.
- Mackie, George, '72, Attleborough, physician.
- Macleod, William A., '76, 60 Devonshire Street, Boston, lawyer.
- Mann, George H., '76, Sharon, Cotton Duck Mills, superintendent.
- Martin, William E., '76, Excelsior, Minn., Martin & Sigafoos, grocers.
- May, Frederick G., '82, Orlando, Orange Co., Fla., contractor and orange grower.
- Maynard, Samuel T., '72, Amherst, Massachusetts Agricultural College, professor of botany and horticulture.
- McConnel, Charles W., '76, 170 Tremont Street, Boston, dentist.
- McQueen, Charles M., '80, 92 Commercial Bank Building, Chicago, Ill., president Progressive Publishing Co.
- Miles, George M., '75, Miles City, Montana, Miles & Strevell, jobbers of hardware and dealers in live stock.

* Died Jan. 8, 1879, of pneumonia, at Middlefield, Conn.

- Mills, George W., '73, Medford, physician.
- Minor, John B., '73, New Britain, Conn., Minor, Nichols & Co., box manufacturers.
- Minott, Charles W., '83, Three Rivers, Ruggles & Minott, nursery-men.
- Montague, Arthur H., '74, South Hadley, farmer.
- Morey, Herbert E., '72, 49 Haverhill Street, Boston, Morey, Smith & Co., merchant.
- * Morse, James H., '71.
- Morse, William A., '82, Thompson's Island, Boston Harbor, assistant superintendent.
- Myrick, Herbert, '82, Springfield, agricultural editor, "New England Homestead."
- Myrick, Lockwood, '78, Cotton Exchange Building, Hanover Square, New York City, Williams, Clark & Co., chemical agent.
- Nichols, Lewis A., '71, Danvers, Boston City Water Works, civil engineer.
- Norcross, Arthur D., '71, Monson, postmaster.
- Nourse, David O., '83, Bolton, farmer.
- Nye, George E., '77, 70 Exchange Building, Union Stock Yards, Chicago, Ill., G. F. Swift & Co., book-keeper.
- Osgood, Frederick H. (M. R. C. V. S.), '78, 238 Pine Street, Springfield, veterinary surgeon.
- Otis, Harry P., '75, Leeds, Northampton Emery Wheel Company, superintendent.
- Page, Joel B., '71, Conway, farmer.
- Paige, James B., '82, Prescott, F. B. Paige & Son, "Mellen Valley Fruit Farm."
- Parker, George A., '76, Halifax, Old Colony Railroad, landscape gardener.
- Parker, George L., '76, Dorchester, florist.
- Parker, Henry F., '77, 5 Beekman Street, New York City, mechanical engineer.
- Parker, William C., '80, 28 School Street, Boston, real estate, insurance, mortgages.
- Peabody, William R., '72, Atchison, Kansas, Atchison, Topeka & Santa Fé Railroad, general agent.
- Penhallow, David P., '73, Montreal, Canada, McGill University, professor of botany and vegetable physiology.
- Perkins, Dana E., '82, care C. M. Winchell, U. S. Survey Boat, Tennessee, Mississippi River Commission.

* Died June 21, 1883, of Bright's disease, at Salem.

- Peters, Austin, '81 (M. R. C. V. S.), Room 28, Adams Building, Court Street, Boston, Veterinary to Massachusetts Society for Promoting Agriculture.
- Phelps, Charles H., '76, 42 Elizabeth Street, New York City, chair manufacturer.
- Phelps, Charles S., '85, Amherst, resident graduate, Agricultural College.
- Phelps, Henry L., '74, Southampton, farmer.
- Plumb, Charles S., '82, Geneva, N. Y., New York Agricultural Experiment Station, assistant director.
- Porter, William H., '76, 36 Bromfield Street, Boston, Harris, Rogers & Co., publishers.
- Porto, Raymundo M. da S., '77, Para, Brazil, planter.
- Potter, William S., '76, Lafayette, Ind., Rice & Potter, lawyer.
- Preston, Charles H., '83, 161 Tremont Street, Boston, with Dr. B. F. Davenport, State analyst, chemist.
- Rawson, Edward B., '81, Lincoln, Loudoun Co., farmer.
- Renshaw, James B., '73, Plainview, Minn., clergyman.
- Rice, Frank H., '75, Hawthorne, Nev., county recorder.
- Richmond, Samuel H., '71, Higley, Orange Co., Fla., civil engineer and surveyor.
- Ripley, George A., '80, 1 Wyman Street, Worcester, farmer.
- Root, Joseph E., '76, 72 Pearl Street, Hartford, Conn., physician and surgeon.
- Rudolph, Charles, '79, Mitchell, Dak., lawyer.
- Russell, William D., '71, Turner's Falls, Montague Paper Co.
- Salisbury, Frank B., '72, Kimberley Diamond Fields, South Africa, trader.
- Sears, John M., '76, Ashfield, farmer.
- Shaw, Elliot D., '72, Holyoke, florist.
- Sherman, Walter A., '79, 182 Central Street, Lowell, veterinary surgeon.
- Shiverick, Asa F., '82, Wood's Holl, Pacific Guano Co., chemist.
- Simpson, Henry B., '73, Stafford C. H., Va., farmer.
- Smead, Edwin B., '71, Hartford, Conn., Watkinson Juvenile Asylum, superintendent of farm schools.
- Smith, Frank S., '74, Albany Woolen Mills, Albany, Wis., manufacturer.
- Smith, George P., '79, Sunderland, farmer.
- Smith, Hiram F. M., '81, 68 Sumner Street, Worcester, physician.
- Smith, Llewellyn, '84, Amherst, State Agricultural Experiment Station, assistant chemist.
- Smith, Thomas E., '76, West Chesterfield, manufacturer.
- Snow, George H., '72, Leominster, farmer.

- Somers, Frederick M., '72, 47 Exchange Place, New York City, journalist.
- * Southmayd, John E., '77.
- Southwick, Andre A., '75, care Beach & Co., Hartford, Conn., superintendent "Vine Hill and Ridge Farms."
- Spalding, Abel W., '81, 327 Hennepin Avenue, Minneapolis, Minn., Spalding & Carr, landscape architects and civil engineers.
- Sparrow, Lewis A., '71, 19 South Market Street, Boston, Judson & Sparrow, dealers and manufacturers of fertilizers.
- Spofford, Amos L., '78, West Newbury, farmer.
- Stockbridge, Horace E., '78, Imperial College of Agriculture, Sapporo, Japan, professor of chemistry and geology.
- Stone, Almon H., '80, North Tarrytown, N.Y., Storrs Military Institution, teacher.
- Stone, Winthrop E., '82, Amherst, State Agricultural Experiment Station, assistant chemist.
- Strickland, George P., '71.
- Swan, Roscoe W., '79, 32 Pleasant Street, Worcester, physician.
- Taft, Cyrus A., '76, Whitinsville, draughtsman and machinist.
- Taft, Levi R., '82, Columbia, Mo., Missouri Agricultural College, professor of horticulture.
- Taylor, Alfred H., '82, Burnett, Neb., dealer in live stock.
- Taylor, Frederick P., '81, Athens, Coke Co., East Tennessee, farmer.
- Taylor, Isaac N., Jr., '85, Haddonfield, N. J., teacher.
- Tekirian, Benoni, '85, Worcester, merchant.
- Thompson, Edgar E., '71, East Weymouth, teacher.
- Thompson, Samuel C., '72, 62 East 127th Street, New York City, Department of Public Works, civil engineer.
- Thurston, Wilbur H., '82, Stouts P. O., Rome, O., superintendent "Tusculum Farm."
- Tucker, George H., '71, Minto, Dak., civil engineer.
- Tuckerman, Frederick, '78, Amherst, physician and lecturer, Massachusetts Agricultural College.
- Urner, George P., '76, Melville, Gallatin Co., Montana, sheep raiser.
- Wakefield, Albert T., '73, 301 Main Street, Peoria, Ill., physician.
- Waldron, Hiram E. B., '79, North Rochester, farmer.
- Ware, Willard C., '71, 255 Middle Street, Portland, Me., Boston & Portland Clothing Co., manager.
- Warner, Clarence D., '81, Amherst, Massachusetts Agricultural College, professor of mathematics and physics.

* Died Dec. 11, 1878, of consumption, at Minneapolis, Minn.

- Warner, Seth S., '73, Northampton, Bowker Fertilizer Co., agent.
Washburn, John H., '78, Mansfield, Conn., Storrs Agricultural School, professor of chemistry.
Webb, James H., '73, 69 Church Street, New Haven, Conn., Alling & Webb, attorneys and counsellors at law.
Wellington, Charles, '73, Amherst, Massachusetts Agricultural College, associate professor of chemistry.
Wells, Henry, '72, 48 Farringdon Street, London, E. C., England, care Lawrence Bros., business.
Wetmore, Howard G., '76, 41 West Ninth Street, New York City, physician.
Wheeler, Homer J., '83, Amherst, State Agricultural Experiment Station, assistant chemist.
Wheeler, William, '71, Concord, civil engineer.
Whitney, Frank Le P., '72, 2179 Washington Street, Jamaica Plain, Boston, boot and shoe business.
Whitney, William C., '72, Tribune Building, Minneapolis, Minn., architect.
Whittaker, Arthur, '81, Needham, farmer.
Wilcox, Henry H., '81, Nawiliwili, S. I., sugar planter.
Wilder, John E., '82, 179 Lake Street, Chicago, Ill., with Wilder & Hale, dealers in leather.
Williams, James S., '82, North Glastonbury, Conn., farmer.
Williams, John E., '76, Amherst, editor "Amherst Record."
Winchester, John F., '75, Lawrence, veterinary surgeon.
Windsor, Joseph L., '82, 2020 State Street, Chicago, Ill., private secretary, office Chicago Cable Co.
Wood, Frank W., '73.
Woodbury, Rufus P., '78, Kansas City, Mo., news and telegraph editor of "Kansas City Daily Times."
Woodman, Edward E., '74, Danvers, E. & C. Woodman, florists.
Wyman, Joseph, '78, 126 Washington Avenue, Chelsea, bookkeeper at 52 Blackstone Street, Boston.
Zeller, Harrie McK., '74, Hagerstown, Md., Baltimore & Ohio Telegraph Co., manager of commercial office.

PUBLIC DOCUMENT.

NO. 31.

TWENTY-FOURTH ANNUAL REPORT

OF THE

MASSACHUSETTS

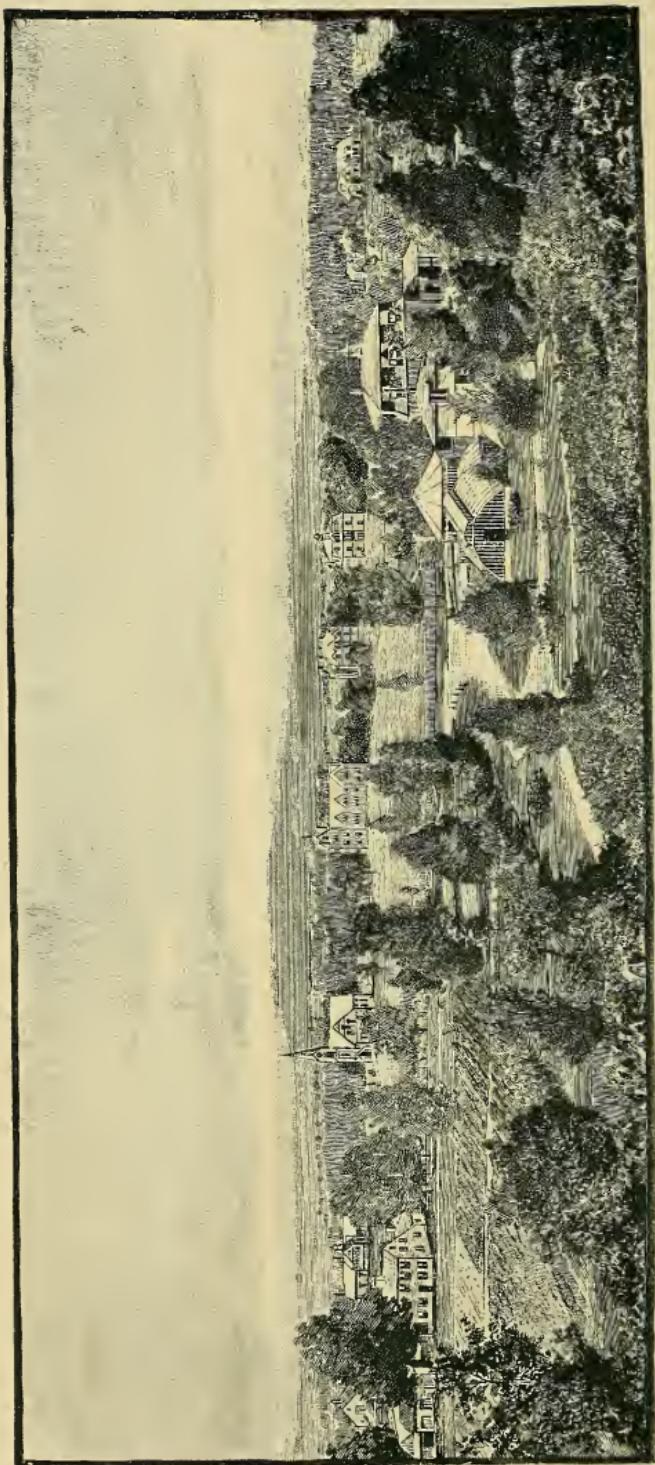
AGRICULTURAL COLLEGE.

JANUARY, 1887.

BOSTON:

GEO. H. ELLIS, PRINTER, 141 FRANKLIN STREET.

1887.



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1887.



Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, JAN. 10, 1887.

To his Excellency OLIVER AMES:

SIR,—I have the honor herewith to present to your Excellency and the Honorable Council the Twenty-fourth Annual Report of the Trustees of the Massachusetts Agricultural College.

I am, sir, very respectfully,

Your obedient servant,

HENRY H. GOODELL,

President.

CONTENTS.

Report of Trustees,	7-19
Faculty and Students,	10
Course of Study,	12
Improvements,	13
Farm,	13
Herd,	15
Gifts,	15
William S. Clark,	17
Report of Treasurer,	20
Military Department,	24
Experiments with New Varieties of Fruits,	29
Relations of Farm to College,	38
Injurious and Beneficial Insects,	44
Catalogue,	52
Course of Study,	58
Equipment,	63
Inventories,	69-78
Agricultural,	69
Horticultural,	73
Natural History,	74
Mathematical,	74
Chemical,	77
Military,	78

ANNUAL REPORT

OF THE

TRUSTEES

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

To his Excellency the Governor and the Honorable Council:

The year just elapsed has been one fruitful of change in the administration of the college. Hon. William Knowlton, a devoted friend, who had served on its board of trustees for fourteen years, died July 18, 1886, and Hon. Marshall P. Wilder, identified with its interests from its very birth, died December 16, 1886. The importance of their services demands more than a passing notice.

In the death of Mr. Knowlton the trustees lost one of their most efficient members and the college a generous friend. His purse and his hand were ever open, and though debarred by sickness in the last years of his life from active participation in duty, yet he never failed to respond to the calls made upon him. Again and again, in the earlier days of the college, he indorsed the notes of its treasurer, and lent his name to keep its credit good. There was hardly a year that was not marked by his benefactions. Now it was fifty dollars for the purchase of new books, now an addition to the herd of the college, now two thousand dollars to secure the Denslow collection of botanical specimens, now it was a hundred dollars for the relief of some indigent student, and now the presenting of a new engine for the cutting of roots and fodder, or furnishing the means for the erection of a

propagating house. In short, wherever a want made itself felt, there he was to be found with ready hand, seeking to supply it. His last act of generosity was adding two thousand dollars to the permanent library fund of the college.

Marshall P. Wilder, whose long life, crowned with years, has but just drawn to a close, was peculiarly identified with the college. It is to him that Massachusetts owes its system of agricultural education. The love for the cultivation of the soil, born amid the breezy hills of New Hampshire, never deserted him, and we find him throughout his long career turning with eagerness from the engrossing pursuits of business to the "delightful occupation of Eden." He was one of the early apostles of agriculture and horticulture, and to his earnest efforts are due the establishment of some of the most flourishing societies. His voice was the first to be lifted up in favor of agricultural education; and in an address, delivered in 1849, before the Norfolk Agricultural Society, he strongly advocated the establishment of an institution where scientific and practical agriculture should be taught. The interest awakened by this address was so great that the following year (1850) a bill was prepared providing for the establishment of an agricultural college and an experimental farm. This bill passed the Senate without a dissenting vote, but was rejected in the House. The next step was the creation of a Board of Commissioners, whose duty should be to report, at the next session of the Legislature, upon the expediency of establishing agricultural schools or colleges. This commission, which consisted of Marshall P. Wilder, Edward Hitchcock, and others, made its report in 1851. Nothing further was done towards organizing a college of agriculture till 1856. In that year several of the gentlemen who had been most active in the project for planting a college, now associated together for the establishment of a school, and obtained an act of incorporation, under the title of the Massachusetts School of Agriculture. Of the persons named in this act, the name of Mr. Wilder heads the list. In 1860, its charter was transferred to several enterprising citizens of Springfield, who determined to raise \$75,000 for the opening of the school in that city, relying upon the Legislature for further endowment. The project would probably have succeeded,

had not the call to arms absorbed public attention. In 1862, the bill submitted by Hon. Justin S. Morrill four years previous, donating public lands for the endowment of a college in each State, to teach such branches of learning as are related to agriculture and the mechanic arts, was finally enacted; and when, in 1863, the Legislature of Massachusetts were deliberating upon the acceptance of this congressional grant, again the name of Mr. Wilder appears, heading the list of a committee appointed by the Board of Agriculture, to present a series of resolutions upon the subject. It was but natural that one who had taken so active a part in the initiatory steps for establishing a college should be placed on its board of trustees when it was fairly organized, and once more we find Mr. Wilder's name placed first in the Act of Incorporation. From that time to the day of his death he never ceased his active connection with the college, attending the meetings of the trustees whenever permitted by the infirmities of old age, and showing his interest by the substantial gifts made from time to time. He presented the Horticultural Department with thirteen hundred specimens of flowering plants and shrubs, transplanted from his own greenhouse and grounds to those of the college. The nursery he stocked with standard pears and ornamental trees, and in the last year of his life he crowned his numerous gifts by sending to the library complete sets of the "Memoirs of the Boston Society of Natural History," the "London Gardener's Chronicle," and thirty-seven consecutive years of the "Transactions of the American Pomological Society." But it is not alone as a benefactor that he will be missed. His thorough business training and sound judgment, his broad views and yet cautious conservatism, made him one of the most excellent of advisers, and his voice, always raised on the side of moderation, was listened to with respect. The places on the board of trustees made vacant by the decease of these two members have been filled by the appointment of Hon. Joseph A. Harwood of Littleton and Elijah W. Wood, Esq., of Newton. The places made vacant by reason of expiration of term of service of Judge Charles G. Davis and Benjamin P. Ware have been filled by the appointment of Francis H. Appleton of Peabody and William Wheeler of Concord.

FACULTY AND STUDENTS.

The retirement of James C. Greenough, for the past three years president of the college, and of Manly Miles, Professor of Agriculture, was followed by the election of Henry H. Goodell, in the place of the former, and Henry E. Alvord as Professor of Agriculture. The latter, long and favorably known by his management of the Houghton Farm, brings to his chair a thorough acquaintance with the details of his subject and an expert knowledge of the dairy and its products. Rev. Charles S. Walker, Ph.D., has been elected College Pastor and Professor of Mental Science and Political Economy. Broad in his views and liberal in his doctrine, he had taught with great acceptance the branches included in his department. A graduate of Yale University, and taking a special post-graduate course in mental philosophy and history, he further supplemented his studies in those branches, and in political economy, by an extended course at Amherst College, receiving from that institution the degree of Ph. D. in 1885. A new department in the domain of Natural History has been created, and the chair has been admirably filled by the election of Charles H. Fernald, Ph.D. He assumed his duties at the beginning of the academic year, coming from the Maine Agricultural College at Orono, where for many years he had been a successful teacher of the Natural Sciences. A student under the lamented Agassiz, he has won especial distinction in the field of the microlepidoptera; and his name is quoted as authority, both in this country and abroad. The other departments have remained unchanged. Professors Goessmann, Maynard, Warner, and Wellington have continued to perform with fidelity and ability the duties devolving upon them. An instructive course of lectures has been given to the Senior class by Professor Goessmann, on the applications of chemistry to the manufacturing industries; and the weekly exercises in elocution have been carefully looked after by James W. Lane, M.A. The work of the year has been most efficiently done; and the college is indeed fortunate in having secured so able a corps of instructors, on so small a pittance as it is able to offer. The salaries paid are from one-fifth to a third smaller than are paid in other insti-

tutions of learning, while the amount of instruction demanded, particularly in practical science, is much greater than in any ordinary classical college. An addition to the corps of teachers is strongly recommended, to diminish the pressure of work, now laid upon individual professors,—work which in no wise belongs to their departments.

The number of students reported on the catalogue is larger than at any time save one since the year 1874, and it is significant of the increased appreciation of the benefits of an agricultural education that a greater number have applied for information about the college than ever before; during the months of July, August, September, and October, over three hundred letters of inquiry having been received, ninety of these being from poor boys, asking whether they could pay their way by work. Of the possible eighty students admissible under the Free Scholarship Resolve, sixty-seven entered their names as candidates for examination, fifty-three presented themselves, and forty-one were accepted, five deciding to enter the next class. Unquestionably, the entire number of scholarships would have been taken, could an assurance have been given of steady work at remunerative pay. The establishment of a Labor Fund, out of which indigent students, struggling for an education, could be paid for work done, would be one of the noblest of charities and be of incalculable benefit to the college. It would help those who need help most. It would not sacrifice their feelings of self-respect, for they would be giving an honest equivalent for money received. It would give to the masses a chance to secure a thorough practical education by their own individual exertions. It would fill up the ranks of the college with the very best of material,—material drawn from those seeking for an education and willing to work for it. And lastly, in the present financial condition of the college, it would enable the Agricultural and Horticultural Departments to inaugurate and maintain experimental work, possible under no other condition. To the consideration of your Excellency and your Honorable Council I most earnestly commend this suggestion. I have called it charity; but it is not charity,—it is education in the broadest and most comprehensive sense; it is the training up of honest, intelligent citi-

zens for service in the State ; it is the carrying on of work, instructive to every one of the forty thousand farmers of the Commonwealth.

COURSE OF STUDY.

This has been so modified as to carry out more fully the intention of the original bill,—to give a thorough practical knowledge of agriculture and horticulture, and at the same time liberally educate the man. To this end, the several studies of the different departments are so arranged as to more perfectly supplement each other and lead to a definite result. Agriculture and horticulture now extend over the entire course of four years, a portion of every term being set apart for their study. Geology and mineralogy, in their application to the constituents of soils and the formation of the earth's crust, are taught in the department of chemistry, a general course in geology following in that of natural history. The professorship of zoölogy and veterinary science, after a vacancy of many years, has been once more filled ; and grouped under this are human anatomy and physiology, entomology, comparative anatomy of domestic animals, and veterinary science. The English Department has been greatly strengthened and extended. More time is devoted to the study of one's mother tongue ; weekly exercises in composition and declamation are held with each class throughout the course ; instruction in rhetoric and English literature is given to the Junior class, while to the Senior year is allotted a consideration of the questions of mental science, political economy, and constitutional government. To round out the instruction in the different departments, a series of lectures by specialists has been planned, which will be given as time and means will allow.

As an aid to the instruction of the class-room, too much value cannot be placed upon the library. It has been increased eleven hundred volumes during the year, but it is as yet only the nucleus of what it ought to be. The student, grappling with the problems presented to him on every hand, demands the best aid that books can furnish ; and a thousand dollars should be expended at once in furnishing the latest scientific works in the several departments.

IMPROVEMENTS.

The year has been one of substantial progress. The appropriations made by the Legislatures of 1885 and 1886, for the erection and repair of buildings and for the purchase of scientific apparatus, has been entirely expended; and the buildings have been completed and occupied since the commencement of the academic year. The new south dormitory and agricultural hall, replacing that destroyed by fire February 4, 1885, and the chapel-library building, are in every way convenient and adapted to supply wants long felt. The entire apparatus and appliances of the laboratory, worn out by daily use for nineteen years, have been replaced; and several thousand dollars have been expended in the purchase of models and apparatus in the departments of physics and natural history. A corn-crib, with a capacity of twenty-eight hundred bushels, has been built at the north-west corner of the barn. An ice-house for use in connection with the dairy, of a capacity of one hundred tons, has been annexed to the farm-house; and the entire lower floor of the barn, occupied by the herd, has been repaired in the most thorough manner. In connection with the latter, the floor and drops have been relaid, the stalls rearranged to add room for fifteen more animals,—five box-stalls built,—feeding-boxes renewed in different patterns, and various styles of stanchions and ties introduced, for illustration and comparison. There are five patterns of stanchions and five different chain and other ties. Two stalls have also been fitted with the Stewart “self-cleaning” floor, for trial.

Protection against fire has been secured by the laying of six hundred feet of four-inch iron main,—connecting with the Amherst water-works,—placing two additional hydrants at suitable points, and purchasing a hose-cart and seven hundred and fifty feet of hose. An efficient fire brigade of the students has been organized, and placed under the direction of the regular army officer stationed at the college.

THE FARM.

During the season of 1886, crops were cultivated on 36 acres of land, thus divided: corn, 23; oats, 6; rye, 5; potatoes and fodder-corn, each 1. The resulting crops were:

1,320 bushels of (shelled) corn; 40 tons of corn-stover; 240 bushels of oats; 70 bushels of rye; 12 tons of straw; 275 bushels of potatoes; and about 8 tons of fodder-corn, fed green. All of this area has been seeded to grass, and without a covering crop,—except one and a half acres, seeded with winter wheat. Nearly all of these 36 acres have been top-dressed. Grass was cut from 41 acres the past season, the product being 90 tons of well-cured hay and 15 tons of rowen. None of this sod land has been broken, and more than half of it has received a dressing of wood-ashes. Much work of land improvement has been accomplished in the west lot and swamp, heretofore used as rough pasture. Fifteen (15) acres have been well cleared, ploughed, and seeded with rye, for pasturage. Twenty (20) acres of the lowest land have been cleared of trees, bushes, and stumps, and converted from nearly a waste tract into fair pasturage. In the same general tract, thirty (30) acres have been ploughed and fenced, about 160 rods of substantial rail fencing having been built. This area it is intended next season to devote to the principal hoed crops. Incidental to this fencing, 30 cords of good wood have been secured. A system of drainage for the western portion of the farm has been adopted, and the work well begun by laying the main drain, 1,500 feet in length, the tile changing from five inches at the head to seven inches at the outlet, and three principal branches of 4-inch tile, aggregating 1,200 feet. It is proposed to gradually complete the work, by laying the laterals, section by section, as practical work for successive classes of students. About 100 rods of old lines of tile, contributing to the same general system, but which have been useless for some years, have been repaired and put in running order. There have also been over 1,200 feet of tile, and tile and stone drains, laid where needed in the lots east of the new chapel. A main sewer, four hundred feet long, of 6-inch tile, has also been constructed for the farm-house and dairy-room, doing away with a cesspool, which had become offensive and dangerous. The entire work of clearing the swamp and laying the tile has been superintended and carried out in the most efficient manner by Mr. David Wright, for many years connected with the college.

The live stock, for the details of which see Inventory of the Agricultural Department, consists of the following animals:—

Four horses,	\$900.00
Forty-four cattle, namely:—	
16 Ayrshires,	\$650.00
6 Guernseys and grades,	635.00
5 Holstein-Friesians,	1,200.00
2 Jerseys,	700.00
15 Grades,	<u>390.00</u>
	3,575.00
15 Southdowns,	165.00
15 swine: 3 Berkshires, 12 Yorkshires,	<u>210.00</u>
Total value,	<u>\$4,850.00</u>

GIFTS

To the Massachusetts Agricultural College during the Year 1886.

From LAWSON VALENTINE, Esq., of Houghton Farm, Mountainville, N.Y.—Jersey Bull, "Edithson," No. 8948, A. G. C. C., 4 years old.

HERBERT MERRIAM, Esq., of Cherrybrook Farm, Weston, Mass.—Guernsey Bull, "Cherry Boy," No. 1252, A. G. C. C., 1 year old.

FRANCIS SHAW, Esq., of Musty Hill Farm, New Braintree, Mass.—Guernsey Heifer, "Lornette," No. 3043, A. G. C. C., 1 year old.

Hon. WM. A. RUSSELL, of Lake View Farm, North Andover, Mass.—Holstein-Friesian Bull, "Pledge's Empire," No. 3458, H. F. H. B., 1 year old.

Mr. CHAS. S. PLUMB (M. A. C., '82), of the New York Agricultural Experiment Station, Geneva.—Collection of Oats, whole plants, 70 named varieties.

HENRY E. ALVORD, of Amherst.—Collection of Indian Corn, 64 premium ears from the Prairie Farmer Corn Show, Chicago, November, 1886.

HOUGHTON FARM, Orange County, New York.—Collection of typical Soils, kiln-dried, with history of same.

ALEX. ARCHIBALD, Delhi, N.Y.—Butter-worker, Rotary Table and Lever.

JAMES MACKINLAY, Bryn Mawr, Pa.—Thayer Refrigerator, Milk-can.

E. C. NEWTON, Batavia, Ill.—Pair of Newton's Improved Animal Ties.

H. M. ROBBINS, Newington, Conn.—Pair of Robbins' Improved Cattle Ties.

- From S. J. ADAMS, Willett, N.Y.—Pair of the Adams' Improved Swing Stanchion.
- O. H. ROBERTSON, Forestville, Conn.—Pair of Patent Swing Cow Stanchions.
- EDWIN PRESCOTT, Boston, Mass.—Pair of Prescott and Mann's Cattle Stanchions.
- BROOKS & PARSONS, Addison, N.Y.—Pair of Smith's Self-adjusting Swing Stanchions.
- WM. SPEAR, Lynn, Mass.—Pair of Spear's Eureka Combined Curry-comb and Card.
- HIRAM KENDALL (M. A. C., '76), Providence, R.I.—Rhetorical prizes for year 1887.
- J. M. THORBURN & SONS, of New York—A collection of 60 varieties of grass seeds for experimental purposes.
- H. D. HILDRETH, Esq., of Dedham—Transactions of Norfolk Agricultural Society, 1849-75.
- HERBERT S. CARRUTH, Esq., of Boston—21 vols. on history and political economy.
- THOS. B. WALES, Esq., of Iowa City, Ia.—9 vols. Holstein-Friesian Herd Book.
- JAS. BUCKINGHAM, Esq., of Zanesville, Ohio—3 vols. American Devon Record.
- Hon. EDWARD BURNETT, of Southborough—9 vols. Herd Reg. of Amer. Jersey Cattle Club.
- C. M. WINSLOW, Esq., of Brandon, Vt.—5 vols. Ayrshire Herd Book.
- EDWARD NORTON, Esq., of Farmington, Conn.—3 vols. Herd Book of Amer. Guernsey Cattle Club.
- EDWARD GRIDLEY, Esq., of Wassaic, N.Y.—7 vols. on Ensilage.
- MASS. SOC. FOR PROMOTING AGRICULTURE—26 copies Des Cars' Tree Pruning, for the Senior class, and 7 vols. miscellaneous subjects.
- HERBERT MYRICK, Esq., of Springfield—25 vols. on miscellaneous subjects.
- Prof. GEO. H. COOK, of Trenton, N.J.—5 vols. Geology of New Jersey.
- ASA W. DICKINSON, Esq., of Jersey City, N.J.—5 vols. miscellaneous subjects.
- JOHN L. HAYES, Esq., of Boston—8 vols. Bulletin of Nat. Assoc. of Wool Manufacturers.
- Hon. MARSHALL P. WILDER, of Dorchester—Trans. Amer. Pomolog. Soc., 1848-86; Gardener's Chronicle, 1841-86; Memoirs Bost. Soc. Nat. Hist., 1866-86.

- From H. HEATON, Esq., of Amherst,— Gardener's Monthly and Horticulturist for 1886.
- PHILANDER WILLIAMS, Esq., of Taunton,— Poultry Monthly for 1886.
- W. STEARNS, of Amherst,— Trans. Rhode Island Soc. for Encouragement of Domestic Interests, 1855-74.
- BENJ. P. WARE, Esq., of Marblehead,— 18 vols. Trans. Essex Agr. Soc.
- Rev. S. SNELLING, of Amherst,— 2 vols. Personal Memoirs of Gen. Grant.
- Mrs. W. S. CLARK, of Amherst,— 60 vols. miscellaneous subjects.
- Dr. FRED'K TUCKERMAN, of Amherst,— 6 vols. miscellaneous subjects.
- A. C. HAMMOND, Esq., of Warsaw, Ill.— 18 vols. Trans. Ill. Hort. Soc.
- PUBLISHERS, Massachusetts Ploughman for 1886.

It is fitting that in this review of the year a tribute should be paid to the memory of him whose guiding hand shaped the course of the college in the first eventful years of its existence, and whose troubled life came to an end March 9, 1886. To Colonel William S. Clark, more than to any other one man, the college owes its present state of efficiency. He was practically its first president, for Judge French did little more than take the initiatory steps, and President Chadbourne had hardly assumed the reins of government when the state of his health compelled his resignation; and it was left for Colonel Clark to organize and establish the new college. How well he succeeded in this may be judged from the fact that, with slight variations, the course remains unchanged to this day, and has been the model copied by sister institutions, both in this country and abroad. For twelve years he stood at the helm, and maintained his course despite the opposition he encountered. His nervous energy and strong will carried him triumphant over every obstacle, and it was during his administration that the college reached its highest point of prosperity. Resolved on having the best, he quickly gathered about him a corps of instructors that made the college famous. His own experiments on the flow of sap and the expansive force exerted by the growing cell attracted such wide-spread attention that the State Po-

mological Society of Michigan solicited permission to publish an edition of several thousand copies of his report for free distribution ; and Professor Agassiz was led to remark that, if the college had done nothing else, this alone was sufficient to compensate the State for all its outlay. His energy was unbounded, and never flagged. He was always restlessly planning some new project to interest the public. At his solicitation, the country meeting of the State Board of Agriculture met in the town of Amherst. On his invitation, a national exhibition of agricultural implements took place on the college grounds, attracting farmers from all parts of the country. With his co-operation, the New England Agricultural Society held there a three days' trial of ploughs. He visited nearly every agricultural society in the Commonwealth, explaining in detail the plan and scope of the college ; and it was during his administration that no less than fifteen of these societies maintained scholarships at the college. Successful as an executive officer, he was still more so as a teacher. Bringing to the lecture-room those stores of information drawn from his own experience and that personal magnetism which made him so delightful a companion, he did not fail to stimulate and awaken the interest of all with whom he was brought in contact. There was no dragging in his department. He demanded the same alertness and quickness of his pupils that he experienced in himself ; and the interest, once awakened, was never allowed to lessen. An enthusiastic lover of nature, he had the rare gift of awakening the same enthusiasm in others ; and the work he laid down is taken up by those who received their first lessons from him. Youthful in his feelings as any boy, he participated in all the pleasures of the students, and made them feel that he was one of them. Yet, amid all this playfulness, he never failed to inculcate those principles of manhood lying at the foundation of true citizenship. But his ardent temperament and over-sanguine nature led him to extremes. He could not brook delay, and his desire to gather about him a great university made him lose sight of the necessity of a slow and steady growth. He could not wait ; and the foundation on which he built was not broad enough for the edifice with which he would fain have crowned it.

I have the honor, in addition to the catalogue and customary report of the military department, to append papers by Professors Maynard, Alvord, and Fernald on the following subjects: "Experiments with New Varieties of Fruits"; "Relations of the Farm to the College"; "On Some Injurious and Beneficial Insects."

Respectfully submitted,

By order of the Trustees,

HENRY H. GOODELL, *President.*

AMHERST, January, 1887.

TREASURER'S REPORT.

Statement of O. B. HADWEN, Treasurer from Jan. 1 to March 16, 1886.

	RECEIVED.	PAID.
Cash on hand Jan. 1, 1886,	\$19,409.00	—
Term Bill account,	675.27	\$263.07
Botanical account,	244.57	405.95
Farm account,	237.32	286.90
Expense account,	12.10	807.82
Laboratory account,	17.47	281.45
Salary account,	—	3,237.50
Library Fund account,	3,212.91	—
State Scholarship account,	2,500.00	—
Hills Fund account,	286.36	15.20
Grinnell Fund account,	10.00	—
Whiting Street Fund account,	20.00	—
Mary Robinson Fund account,	28.64	—
Interest account,	86.12	—
Extra Instruction account,	—	29.00
Insurance account,	—	2,000.00
Cash paid Frank E. Paige, treasurer,	—	16,021.47
" " treasurer, by bursar,	—	156.16
" " Library Fund,	—	3,212.91
" " Oct. 28, 1886,	—	20.68
Credit by overcharge,	—	1.65
	\$26,739.76	\$26,739.76

Statement of FRANK E. PAIGE, Treasurer from March 16, 1886, to Jan. 1, 1887.

	RECEIVED.	PAID.
Cash of O. B. Hadwen, treasurer,	\$16,198.31	—
Term Bill account,	3,077.56	\$1,874.44
Botanical account,	4,166.80	4,632.21
Farm account,	1,638.22	3,655.93
Expense account,	89.11	4,985.88
Laboratory account,	712.34	319.93
Salary account,	—	13,128.06
Trustee Expense account,	—	350.00
Library Fund account,	4,022.99	4,022.99
Endowment Fund account,	13,031.36	—
State Scholarship account,	7,500.00	—
Hills Fund account,	331.12	240.00
Grinnell Fund account,	30.00	40.00
Whiting Street Fund account,	20.00	—
Mary Robinson Fund account,	33.38	42.00
Extra Instruction account,	—	408.00
Insurance account,	—	13,211.86
Grading account,	493.80	566.90
Advertising account,	26.96	339.46
Farm Improvement account,	215.00	21.50
Interest account,	25.00	—
Cash on hand Jan. 1, 1887,	—	3,579.29
	\$51,611.95	\$51,611.95

Cash and Bills Receivable Dec. 31, 1886.

Term Bill account,	616.00
Laboratory account,	207.99
Farm account,	220.49
Botanical account,	397.92
 Cash on hand belonging to General Funds (see Note),	 319.98
Total,	\$1,762.38

NOTE.—The remainder of cash on hand, as shown by former account, belongs to Insurance account, Hills Fund account, Whiting Street account, and Mary Robinson account.

Bills Payable Dec. 31, 1886.

Expense account,	377.45
Farm account,	241.04
Term Bill account,	64.00
Trustee Expense account,	250.98
Extra Instruction account,	48.00
Salary account,	776.81
Reading-room appropriation,	100.00
Botanical account,	263.92
 Total,	 \$2,122.20

Value of Real Estate.

	LAND.	Cost.
College farm,	37,000.00	
Pelham quarry,	500.00	
		\$37,500.00
	BUILDINGS.	Cost.
Laboratory,	10,360.00	
Botanic museum,	5,180.00	
Botanic barn,	1,500.00	
Durfee plant-house and fixtures,	12,000.00	
Small plant-house and fixtures,	800.00	
North college,	36,000.00	
Boarding-house,	8,000.00	
South dormitory,	37,000.00	
Graves house and barn,	8,000.00	
Farm-house and barn,	4,000.00	
Farm barns and sheds,	14,500.00	
Stone chapel,	31,000.00	
Drill Hall,	6,500.00	
President's house,	11,500.00	
Four dwelling-houses and shed purchased with farm,	10,000.00	
		196,340.00
		\$233,840.00

Inventory of Personal Property Dec. 31, 1886.

Farm,	\$8,200.00
Laboratory,	1,414.33
Boarding-house,	400.00
Fire apparatus,	500.00
Library,	5,000.00
Natural History collection,	2,351.12
Botanical department,	9,897.75
Mathematical department,	3,287.26
	<hr/>
	\$31,050.46

Summary Statements.

ASSETS.

Total value real estate, per inventory,	\$233,840.00
Total value personal property, per inventory,	31,050.46
Total cash on hand and bills receivable, per inventory,	1,762.38
	<hr/>
	\$266,652.84

LIABILITIES.

Bills payable, as per inventory,	\$2,122.20
	<hr/>
Balance,	2,122.20
	<hr/>
	\$264,530.64

This is to certify that I have examined the payments of FRANK E. PAIGE, Treasurer of Massachusetts Agricultural College, and find them properly entered and accompanied by proper vouchers.

HENRY COLT, *Auditor.*

Jan. 6, 1887.

Funds for Maintenance of College.

Technical Educational Fund, United States grant,	
Amount of,	\$219,000.00
Technical Educational Fund, State grant, . . .	\$141,575.35
These funds are in the hands of State Treasurer. By law, $\frac{2}{3}$ of the income is paid to the Treasurer of College, $\frac{1}{3}$ to Institute of Technology. Amount received in 1886, . . .	\$13,031.36
State Scholarship Fund, \$10,000. This sum was appropriated by the Legislature, 1886, and is paid in quarterly instalments to College Treasurer,	10,000.00
Hills Fund of \$10,000, in hands of College Treasurer. This was given by L. M. and H. F. Hills, of Amherst. By the conditions of the gift, the income is to be used for maintenance of a botanic garden. Income, 1886,	617.48
Unexpended balance, Dec. 31, 1886, \$845.14.	
Grinnell Prize Fund of \$1,000, in hands of College Treasurer. Gift of ex Governor William Claflin; was called Grinnell Fund in honor of George B. Grinnell. The income is appropriated for two prizes to be given for the best examination in agriculture by graduating class. Income, 1886,	40.00
Mary Robinson Fund of \$1,000, in hands of College Treasurer; given without conditions. Income has been appropriated to scholarships to worthy and needy students. Income, 1886,	62.02
Unexpended balance of income, Dec. 31, 1886, \$223.02.	
Whiting Street Fund of \$1,000. A bequest without conditions. Income, 1886,	40.00
Unexpended balance of income, 1886, \$260.	
Library Fund, for use of College Library. Amount, \$3,822.99.	
Deposited in Amherst Savings Bank.	
Total income,	\$23,790.86

To this should be added amount of tuition, room rent, receipts from sale of Farm and Botanic Garden: amount of same can be learned from statement of Treasurer; tuition and room rent, under head of Term Bill.

FRANK E. PAIGE, *Treasurer.*

MILITARY DEPARTMENT.

AMHERST, MASS., Dec. 17, 1886.

To the President Massachusetts Agricultural College:

SIR,—I have the honor to submit the following report of the military department for the year ending Dec. 17, 1886:

With the increased number of cadets made by the last Freshman class, the interest felt in this department is much greater. The larger the companies can be made, the more pride the officers seem to take in them; and for that reason I have divided the battalion into two companies only, each company being large enough to make two for battalion drill.

The Senior class is required to do all the drilling, and during the fall term has been occupied in teaching the recruit drill to the Freshman class. The work has so far advanced that the Freshmen are now ready to be assigned to companies, and take part in company and battalion drill. The Junior and Sophomore classes have been occupied in mortar and light battery drill. The mortar drill was interesting from the fact that much of the time was spent in target practice, which, although not entirely satisfactory in regard to accuracy, served to explain the principles and capabilities of the piece. With better ammunition, no doubt good results could be obtained.

The work in the Drill Hall begins about the first of the winter term, and consists of bayonet and sabre exercises, parades, reviews, guard-mount, and out-post duty, and such other exercises as will give the cadet an insight into the duties of officers and soldiers in service.

While the corps was in Boston attending the Bay State Fair, the Senior class made a visit to Forts Warren and Independence, in the harbor. A thorough inspection was made of Fort Independence, both as to its construction and

armament. The drill of the large sea-coast pieces was explained, and the ammunition examined, as well as all the implements and material used in a large work.

Through the courtesy of the Depot Quartermaster, Major Robinson, the steamer was detained at Fort Warren until the class had made a short visit to this most interesting work.

Oct. 24, 1886, Colonel Roger Jones, of the Inspector-General department, U.S.A., visited the college for the purpose of making an inspection of the military department. No parade or military exercises could be shown him, as the visit was made on Saturday; but the buildings, armory, and recitation rooms were examined, and the inspection of the battalion will take place next June, at which time Colonel Jones informs me he will again visit the college.

This inspection is made in conformity with an order from the War Department, so that the authorities at Washington may understand the work done by regular officers stationed at colleges.

The order issued in this department compelling cadets to make good all absences from military duties has had a most beneficial effect. I have had occasion to order but two extra drills since that time, and I find that cadets now are never absent without urgent reason. When all are present, the drill can be made much more satisfactory, and more interest is felt by all concerned.

During the fall term, a fire brigade was formed, and detailed instructions issued in orders for the government of the cadets in case of fire. Fire plugs have been placed at convenient points, and one or two streams of water can be turned upon any building in a very short time. Drills of the fire brigade will take place frequently, until all are familiar with these duties.

In this connection, I would recommend that fire ladders and buckets be supplied, as well as hand grenades and fire extinguishers. A new target butt has been built near the site of the old one, which greatly facilitates the work of target practice. Ammunition in sufficient quantity is always on hand, and practice takes place regularly on Saturdays. The weekly inspection of rooms has continued through the year, and with beneficial results, the rooms presenting an

appearance of order and comfort, showing that the cadets have acquired those habits of neatness so necessary, not only in military, but in business life.

The sabre belts on hand, the property of the State of Massachusetts, are worn out and unfit for use. The Adjutant-General of the State was addressed on the subject, but was unable to furnish new material. He recommended that application be made to the Legislature for an appropriation of one hundred and fifty dollars, to be expended for the purpose.

In regard to the Drill Hall, I can only repeat my suggestions of last year. There are a number of cadets now in college that are unable physically to undergo any great amount of fatigue, and have been excused by proper medical authority from taking part in the drills during the winter months. If the Drill Hall was ceiled and properly heated, a gymnasium would be added that would give all the cadets a comfortable and proper place for athletic exercises.

THEORETICAL AND PRACTICAL COURSE OF INSTRUCTION.

THEORY.

Winter term, Freshman year. One hour per week for the term. Recitations in Upton's Infantry Tactics. School of the Soldier. School of the Company. Skirmish Drill.

Winter term, Sophomore year. One hour per week, half the term. Recitations in U. S. Artillery Tactics. School of the Soldier. Sabre Exercise. Manual of the Piece.

Senior class. One hour per week, fall, winter, and spring terms. Recitation in Field Fortifications. Organization of Armies and Ceremonies.

PRACTICE.

All students (unless physically disqualified and furnished with a surgeon's certificate to that effect) will be required to attend all military duties and exercises, those pursuing a special or partial course not being exempt as long as they remain at the college.

As soon as possible after entering the college, students will be required to provide themselves with a full uniform,

comprising coat, blouse, trousers, cap, white gloves, etc., costing about thirty dollars. All students are required to conduct themselves in a quiet, orderly, and soldierly manner. Obedience to superior officers and orders must be prompt and willing at all times.

To insure a proper sanitary condition of the college buildings, each Saturday the Commandant makes a thorough inspection of all rooms and buildings. During this time, the students, in full uniform, are required to be in their rooms, for the proper police of which they are held strictly accountable. At the beginning of each term, issues of such equipments as they require will be made to the students. Receipts will be taken for each article issued, and cadets will be held responsible for any loss or injury to said articles.

For practical instruction, the following public property is in the hands of the college authorities :—

One platoon Napoleons (light twelve).

Seventy-five sabres and belts.

One hundred breech-loading rifles, calibre forty-five.

Several accurate target rifles.

Two eight-inch siege mortars, with complete equipments.

For practice firing, the United States furnishes blank cartridges for all guns, and ball cartridges for rifle practice.

Drills, amounting to about four each week, are as follows :—

Infantry: school of the soldier, company and battalion; manual of arms; sabre and bayonet exercise; skirmish drill; target practice and ceremonies.

For instruction in infantry tactics, the cadets are organized into a battalion of two or more companies under the Commandant. The commissioned officers of the corps are selected from those cadets of the Senior class who show the greatest aptitude for military duty and ability to impart this knowledge to others. All Seniors in turn are placed in command of the companies and battalions, and are liable to be called upon at any time to perform field and staff duties.

Commissioned Staff.

J. M. MARSH, *First Lieutenant and Adjutant.*

H. N. W. RIDEOUT, *First Lieutenant and Quartermaster.*

Non-commissioned Staff.

B. L. SHIMER, *Sergeant Major.*

E. H. DICKINSON, *Quartermaster Sergeant.*

A Company.

E. W. BARRETT, *Captain.*

J. C. OSTERHOUT, *First Lieutenant.*

C. L. MARSHALL, *Second Lieutenant.*

G. W. CUTLER, *First Sergeant.*

A. I. HAYWARD, *Second Sergeant.*

F. F. NOYES, *Corporal.*

B Company.

T. F. B. MEEHAN, *Captain.*

A. L. DE ALMEIDA, *First Lieutenant.*

E. F. RICHARDSON, *Second Lieutenant.*

G. E. NEWMAN, *First Sergeant.*

F. H. FOSTER, *Second Sergeant.*

S. H. FIELD, *Corporal.*

Very respectfully, your obedient servant,

GEO. E. SAGE,

First Lieutenant, 5th Artillery.

HORTICULTURAL DEPARTMENT.

RESULTS OF EXPERIMENTS WITH NEW VARIETIES OF FRUITS.

For several years past, much attention has been given to the production of new varieties of fruits in all parts of the country. This may be in a measure accounted for by the fact that none of the standard varieties of any kind of fruits combine all the desirable qualities. Until within a few years, dependence was placed largely upon the discovery of chance seedlings; and with the larger fruits much is to be hoped from these local discoveries. The results would undoubtedly be more within our control could we but wait to test the varieties grown from carefully selected seed or those resulting from the careful hybridization of our best varieties. Progress would also be greater, but we Americans are too much in a hurry—are living too fast—to wait and watch so long for such apparently small results; and for this reason few varieties of either pears or apples superior to the older, standard kinds have been added to the list for many years. With the smaller fruits, or those requiring only from two to five years to produce fruit, the number of varieties of promise or of real merit has been, with many kinds, quite large.

Many of our nurserymen, in their efforts to obtain and propagate for dissemination these new varieties, prove a blessing to the community when they send out a really good thing; but, as is more often the case,—and even the best judges frequently make mistakes,—the result from sending out varieties that prove worthless is ten or even hundreds of times greater loss in time, money, and disappointed hope.

Having obtained many of the new varieties as soon as they were given to the public, and made comparative tests,

we give our conclusions in regard to them, based in most cases upon a trial up to fruiting, but in some more or less modified by the results of the same variety in other localities. Our experiments, in many cases, only extend over a few years ; and it must be borne in mind that many conditions—such as proper or improper soil (which can only be determined after many years' trial), the peculiarities of the seasons during the term of trial, etc.—must affect the results materially. We think it is safe to say that, under ordinary circumstances, the value of a new variety of apples cannot be determined in less than twenty years ; the pear and cherry, not less than fifteen years ; the peach, plum, and quince, not less than ten years ; the grape, blackberry, and currant, not less than eight years ; and the strawberry, not less than five years.

Varieties largely advertised and of unusual promise sometimes become well known in less time.

THE APPLE.

We have yet to learn of a variety that we feel satisfied will take the place of the old standard market and home sorts for New England. We mention a few which have desirable qualities, and in some localities and upon a more extended trial may prove valuable.

Yellow Transparent.—Nearly all reports agree that this apple, of Russian origin, is earlier, of larger size and better quality, than the Early Harvest. In vigor of growth of tree, we find it satisfactory ; but it has as yet borne no fruit on the college grounds.

Alexander.—This variety, also of Russian origin, is almost everywhere gaining favor, on account of its large size, good quality, and productiveness. It ripens a little later than the Gravenstein, but is hardly equal to it in quality.

Haas or Fall Queen.—A variety originating near St. Louis, Mo., of brilliant color, large size, very productive, and of fair quality. The tree is upright, of very vigorous growth, coming into bearing quite young, and when well known will probably be a very salable variety.

Red Russet.—This, although not a new variety, is attracting considerable attention as a late-keeping winter fruit. The tree is vigorous and upright like the Baldwin, produc-

tive of fruit of medium to large size, resembling the Baldwin in form and color, but more or less covered with patches of russet. In quality it is better than the Roxbury Russet, but, like that variety, is liable to wilt if kept in a dry cellar. Its long-keeping qualities, and being a more showy fruit than the latter, make it a very promising variety.

The value of a variety of fruit of any kind depends upon its beauty and the appreciation it meets with the public, and the real value of this variety for market purposes is yet to be determined.

Pewaukee.—This variety has developed no qualities which will entitle it to a place in advance of the older varieties, ripening at the same time.

Many other varieties are being tested, but none have been grown long enough for us to determine their value.

PEARS.

Less progress, perhaps, has been made with the pear than the apple, as with the latter fruit a good very early or a good late-keeping winter pear is still what the fruit-grower is looking for.

Among the varieties that have been tested are the *President Clark*, *Francis Dana*, *Student*, and *Crumbs of Comfort*. Seedlings raised by the late Francis Dana, Esq., were sent to us for testing by Col. Eliphalet Stone, of Dedham, Mass. While all of them have some good qualities, none combine enough of the good, and have too few superior qualities to recommend them.

Lawson.—It is claimed for this variety that it is "the largest early pear and the handsomest of all pears," but no claim is made of superior quality by the introducers.

It has been planted in the college experimental plats beside a variety received many years ago from Kentucky, under the name of Early Harvest. In habit of growth, color of shoots and foliage, no difference can be distinguished; and if the fruit proves of no better quality than the Early Harvest (which may prove only the old French variety *Jargonelle*), its planting will only result in loss, for in quality it is one of the poorest.

Dana's Hovey.—As a winter pear of fine quality we find nothing better. Its small size, however, is a great objection.

Frederick Clapp.—This is a variety of good quality and of some promise, but its time of ripening will prevent its becoming a very profitable variety.

Japanese or Oriental Pears.—These and their hybrids,—namely, Keiffer, Leconte, etc.,—so far as they have been tested, have proved of little value in New England. Their vigor of growth and large healthy foliage may be an improving element in hybridizing with our best native kinds.

PEACHES.

The crops of this fruit in the past few years have been so irregular in this section of the country that but little headway has been made in testing new varieties.

Of the twenty or more new varieties tested, we feel satisfied that there are a few that will prove valuable.

As to hardiness, our experience goes to show that the white-fleshed varieties are more hardy than those with yellow flesh, and possess a richer flavor; but, as most of them are clingstones, they are not so desirable for canning purposes. The *Alexander*, *Amsden*, *Waterloo*, and *Early Canada* are too nearly alike to be classed as distinct varieties. They are hardy, productive, early, of good quality, and profitable when well grown. *Mountain Rose* is of good quality, of larger size, a little later and productive. *Wager* and *Pratt*, both claimed to be certain to reproduce true from seed, have made good growth of well-ripened wood, but have produced no fruit.

Of the yellow-fleshed varieties nothing has proved better than the *Early* and *Late Crawford*.

Experiments.

The great difficulty in growing peaches in New England has been the destruction of the buds by our cold winters. We have found no difficulty in keeping most of the trees of our orchards in a healthy condition, although some have died from winter killing, and a few, perhaps, from the disease known as the *yellows*; but we have restored trees that were badly diseased to perfect health, and continue to plant trees in the places where old ones have died out.

To prevent the destruction of the buds by the cold, we

have instituted a series of experiments, an outline of which we will here give, in the hope that it may stimulate others to investigation in the same direction.

First. Loosening the soil about the roots on one side, laying the tree flat on the ground, holding it in place with soil, and carefully protecting the loosened roots with a bank of soil and the tops with pine boughs, corn-stover, etc. This can be easily accomplished at small expense; and, by carefully packing the soil with some good compost about the roots, the following spring little injury will result to the growth of the tree.

Second. Drawing the top branches together and tying them closely. With young trees not over five or six inches in diameter, this was easily accomplished. With larger trees, two or three branches near together were tied up. Some of these were afterward covered with mats, others had pine boughs tied in among the branches, and some were tied up before the leaves had dropped, so that the leaves served as a protection.

Third. Having noticed that the buds and branches after having been injured by cold lost much of the waxy or glossy covering they had while uninjured, it was suggested that something might be applied to protect them or prevent the removal of this material, if that had any protecting or preserving quality. To this end, some trees were syringed at intervals of a week or ten days with lime wash, lime wash and paste, a solution of flour paste and a solution of glue. To some of these trees plaster was applied after the glue or paste solutions, and to others fine sawdust before the solutions became dry on the branches, so that it adhered firmly to them, and especially to the bud clusters.

The above experiments have been made at intervals of from one to two weeks since November 15.

What will be the results no one can predict, but, if these methods fail, we shall try yet others; and, as the spirit of progress is inherent in the American fruit-grower, we feel confident that sooner or later a cheap and easily applied remedy will be discovered to save our peach crop from destruction by cold.

THE PLUM.

As with the peach, the limited cultivation and the uncertainty of fruiting make it difficult to determine what are the most desirable and profitable varieties of the plum. Consulting the markets, we find that the very early and the very late varieties are more profitable than those that ripen in mid-season.

We find of the varieties that have fruited abundantly the most desirable kinds for market are the *Bradshaw*, *Washington*, *Yellow Egg*, and *Coe's Golden*, and perhaps also the *Victoria* or *Sharpe's Emperor*.

For home use we would add *Imperial Gage* and *Green Gage*.

We find no difficulty in preventing injury to the fruit by the plum curculio by jarring the trees three or four times per week early in the morning; but a simpler and cheaper method is to plant the trees in the poultry yard.

Seedlings of the *Wild Goose* plum have not proved of much value in New England.

The Japanese plums, which are of large size and fine quality, are of great promise, and, if they prove hardy and free from disease, will be a great addition to our list of fruits.

APRICOTS.

This delicious fruit has been so uncertain in New England in the past that, except under the most favorable conditions, few attempts are now made to cultivate it.

The recent introduction of Russian varieties, on account of their greater hardiness, may enable us to cultivate it with success. The best varieties, according to Prof. J. L. Budd and Mr. Charles Gibbs, are the *Alexis*, *Alexander*, *J. L. Budd*, and *Nicholas*.

QUINCES.

Notwithstanding the persistent advertising of new varieties by parties interested in their sale, we are unable to see much improvement over the old standard Orange Quince. The *Champion*, the *Rea*, and probably the *Meech* are later in ripening than the Orange, do not color up as fully, nor are they of any better quality than the latter when well grown. The trees may begin bearing a little younger, which is perhaps a slight advantage.

GRAPES.

Of the many new varieties of grapes, two white kinds stand out very prominently for public favor,—the *Niagara* and *Empire State*.

The first, while only of medium quality, is vigorous, hardy, and wonderfully productive. Its principal fault is its late ripening, not being any earlier than the *Concord*. The *Empire State* ripens a little before the *Concord*, and from its origin — *i.e.*, the *Clinton* and *Hartford Prolific* — it is hoped that it may also prove to be a late-keeping variety.

The place that a white grape will take in our markets is a little uncertain. The indications now are either a black grape with an abundance of bloom, a red or pink grape with little bloom, or a white grape will meet with more favor, other qualities being equal, than those of less distinct color.

Upon some forty other new varieties tested we do not wish to pass judgment until another season's trial.

BLACKBERRIES.

Of the perfectly hardy kinds (if any can be said to always withstand our severe winters), the *Snyder*, *Wachusett*, and the *Agawam* have borne good crops for several years. Of these the *Agawam* is the earliest and of the best quality, while it is firm enough for ordinary shipping. We would give it the first place among the thoroughly tested varieties. The *Wilson Junior*, *Early Harvest*, and *Early Cluster* have proved tender, and can only be successfully grown by protecting during the winter.

BLACK-CAP RASPBERRIES.

As grown in our experimental plots, the *Souhegan*, *Doolittle*, and *Tyler* are very nearly alike in time of ripening, quality, and productiveness. The *Centennial*, although a little later than the above, is very vigorous, producing abundant crops of large shining blackberries of fine quality. The *Springfield* is not very unlike the old *Davison Thornless*, but is more vigorous, and is very early and productive and of good quality; a good variety for those who are sensitive to the slight scratches necessary in gathering other kinds. The *Carmen* was sent to us when first introduced, but the

plants were in so poor condition that only one out of the six lived : we are therefore unable to make a satisfactory report upon its merits. *Shaffer's Colossal* is indeed colossal in vigor of plant, size of fruit, and productiveness. In quality, it is very much like the red raspberries ; but it is feared that its color, a reddish purple, will prevent its ready sale.

RED RASPBERRIES.

Much advance seems to have been made in the new varieties. The *Marlboro*, on account of its large size, earliness, vigor, and productiveness, promises to be a valuable market variety, although its quality is much inferior to the *Cuthbert*. The *Hansel* is early, productive, of medium size and good quality ; but the plant is rather weak in growth and has developed, the past season, a tendency to mildew badly. The *Rancocas* is similar to the latter in size, quality, and time of ripening, but is of stronger growth, and has been thus far entirely free from mildew. Both produce a large number of suckers, while the *Marlboro* produces comparatively few.

CURRANTS.

As grown in our fields, the new varieties have not shown the superior vigor and productiveness claimed for them by the originators. It is generally the case that a new variety, purchased at a high price, is given the best possible place in the garden and receives the best of care ; while the old varieties, with which it is to be compared, are still allowed to remain in the usual grass-bound row, with no extra care. Under these circumstances, it is no wonder that the "pet" shows wonderful improvements over the older sorts. While there is room for advance in the qualities and productiveness of this fruit, we know that great improvements can be made by good cultivation of the older varieties, without the expense of purchasing high-priced new kinds.

THE STRAWBERRY.

The *very early* berry of large size, good quality, vigorous growth, and good shipping qualities has not been as yet found, unless it may be among the many candidates of 1886. We are inclined to think that the *May King* will take the

place of the *Crescent* as a general market fruit. It is as early, of better quality and fair size, and nearly or quite as productive.

The *Jewell* and *Belmont* need another year's trial, at least, to establish their merits for general cultivation.

The former, while vigorous in growth of foliage, produces but few runners; an advantage, perhaps, when grown in hills or stools, but a serious objection for the ordinary method of matted rows.

Early varieties have generally proved the most profitable; and there has developed in most of our markets a demand for very large berries of good quality, while small berries hardly pay the cost of picking.

S. T. MAYNARD.

RELATIONS OF THE FARM TO THE COLLEGE, AND ITS AGRICULTURAL DEPARTMENT.

Object lessons have become one of the leading features of successful methods in modern education. In almost every department of instruction, appliances and apparatus are deemed essential, often requiring large expenditures ; and the progressive spirit of an institution of learning is largely indicated by the completeness of its equipment in aid of class-room work.

In any school of agriculture, where theory and practice must go hand-in-hand, it is evident that the matter of providing facilities for teaching, with objects for illustration and instruction, is of the very first importance.

The Agricultural College, like other colleges, arranges its work of instruction in distinct divisions, and has especially prominent its several departments of technical science. All admit the need of having these properly equipped with aids to teaching ; and, by common consent, they are supplied, by liberal outlay, with cabinets and collections, maps and models, instruments and apparatus, besides special books of reference.

"Without excluding other scientific and classical studies," the Agricultural College has, for its main object and special purpose, to provide a comprehensive and practical education, which shall be a proper training and preparation for the business of farming. It is a technical school of agriculture. It is no undue discrimination, therefore, to regard its department of agriculture as its central feature. This should be the focus for all the work of the various scientific departments. Here must be taught the practice of the art and the application of the sciences. Hence, pre-eminently, the agricultural department of the college should be liberally maintained and completely equipped for object-teaching.

First, in the means of instruction for the agricultural department, is the college farm, with its lands and buildings, its stock and tools, its crop and daily operations throughout the farming year. And, second, such collections of specimen implements, soils, manures, and farm products, with models, illustrations, and charts, as can be provided by periodic allowances of money and the work of diligent teachers.

The relation of the farm to the college is thus clearly indicated. Its primary function and its only use, if necessary, is to serve as the laboratory and demonstratory material for the instructor, to be managed—or mismanaged—as may best suit the purpose of example and illustration. The college farm should therefore be under the immediate control of the Professor of Agriculture, and conducted to assist and supplement the work of the class-room, as absolutely as the plant-house and herbarium by the Professor of Botany.

The one thing above all others which should *not* be required of the college farm is to be “self-supporting,” or conducted for the purpose of yielding an annual profit. The chemical department has its expensive laboratory and fittings, requiring a large current outlay for supplies; the physical lecture-room has costly apparatus; the departments of natural history and botany have their museums, collections, and appliances; and hundreds or thousands of dollars may well be invested in high-priced manikins and plastic models of domestic animals and plants. But whoever heard of a demand upon the laboratories of a college to heat and light the premises, of requiring the telegraph and telephone apparatus to yield a handsome dividend, or of expecting the Auzoux models to give milk and bear fruit? Yet this would be just as logical as insisting that the farm must show an annual profit.

This theory of the main duty and purpose of the college farm by no means involves wasteful methods to any extent, or extravagant expenditure. Undoubtedly, it should, as a whole, be an example of good husbandry and progressive farming. It is well to conduct some one or more divisions of the farm with distinct and accurate accounts, like a dairy herd, or a flock of sheep, a field crop, an orchard, or nursery, so as to demonstrate the profit of farming as a business, when well managed. On the contrary, the different kinds

of live stock kept may properly include animals which daily demonstrate that they are unprofitable: the very fact of the variety maintained will tend to pecuniary loss, while the most undesirable stock may be of highest value by the lessons it can teach. The variety of crops and the methods of cultivation may well include some known to be unproductive: negative results are often the most striking and instructive. But where a college farm, in all its parts, shows a yearly profit, it may safely be regarded as failing to properly perform its function as an accessory to the educational facilities of the institution.

The word "agriculture" has been used above in its broadest sense, including horticulture. Where, as in Massachusetts, forestry, flowers, fruits, and market-gardening have been assigned to a separate department, wisely and well, the same principles will apply to the horticulture of the college as to its agriculture. This division existing at Amherst, it is only proper for me to refer, in detail, to the college department of agriculture, as thus limited.

The entire area of the college estate is three hundred and eighty-three acres. Of this, forty-eight acres have been leased to the Experiment Station, and ninety acres, all east of the main highway, are set apart for the horticultural department and for forest growth. The college buildings, with lawns, drives, parade-ground, and ravine, occupy twenty-five acres. There remain two hundred and twenty acres for the farm proper. Of this, forty acres are in wood, which it will be undesirable to clear at present, and five acres are occupied by buildings, roads, and yards. The available land for farming operations is thus reduced to one hundred and seventy-five acres. Just about half of this is now in grass, a large part of it being seeded during the past year. The remaining ninety acres, which has been known as the West swamp lot, and used as an undivided pasture, is the land on which a system of draining and improvement has been inaugurated; and it may now be considered in three nearly equal portions. One has been drained, ploughed, fenced, and will be cultivated in corn and other crops during the season of 1887; another has been cleared, ploughed, and seeded as improved pasture; and the third, although cleared of bushes and stumps, is still rough, natural pasturage. The

improvements begun contemplate the gradual reclaiming of nearly all of this western section of the farm, bringing it into arable condition, and dividing it into suitable fields for tillage and pasture. This will make it possible to leave the small lots around the college buildings permanently in grass, to which they are best adapted, cultivating them only at long intervals, when they may need reseeding.

If the theory above presented, as to the relations of the farm to the college, is correct, the general management of the farm can be easily made to conform thereto. The present condition of the fields is suited to this purpose. There is a fair variety of soil,—light and heavy, dry and wet, old sod and new grass, tillage on old and newly reclaimed lands, and fields in several stages of improvement,—as already described. The system adopted will provide this diversity of condition and treatment for some years to come. It will also tend to a gradual improvement in the condition, production, and value of the entire area.

For purposes of instruction, a greater variety of field crops should be grown than has been done in late years. Although they may not all be profitable, there should be the small grains adapted to this climate,—potatoes, roots, and different fodder crops,—all sufficient in area to serve as illustrations of the nature and growth of the plants themselves and the operations necessary to their cultivation. Special crops, like broom-corn, tobacco, beans, and hops, are usually to be found near enough to the college to be seen by the classes during the growing season.

The recent additions and repairs at the farm buildings will do much towards putting them in a condition more creditable to the State and better adapted to efficient and economical management. But the funds available will by no means accomplish all that ought to be done. It should be remembered that the main farm buildings were erected in 1869, and the sheds two years later; and very little has since been expended upon them for repairs. As ordinary matters of prudence, the barn should be reshingled the present year and all the buildings should be repainted. Several detached buildings, on different parts of the farm, which were formerly available for stabling and storage, have been assigned to the horticultural department and Experi-

ment Station. This fact, and the natural growth of the farm operations, equipment, and products, combine to render the capacity of the sheds, built fifteen years ago, quite insufficient for present purposes. A number of the better farm implements have to be housed in the basement of one of the college buildings, an inappropriate and very inconvenient makeshift. To furnish needed accommodations, the sheds adjoining the barn should be entirely rearranged and repaired, including the building of a new horse stable. Power should be furnished for cutting and grinding, and better provisions made for heating water and warming a few apartments in the sheds. Whether ensilage-feeding is in general economical and beneficial or not, there should be one or more good silos connected with the barn to fully illustrate the system and test its merits. The need of these improvements is manifest; and their cost, thoroughly done, will be more than can probably be taken for this purpose from the regular income of the institution.

The present equipment of the farm, in tools and machinery, does not properly illustrate the great advance made in farm mechanics during recent years; but it is hoped that enterprising manufacturers and agents will recognize the advantage of having their new and improved implements put to a practical test, and kept permanently on exhibition at the college. Contributions of this kind, already begun, will prove at once a benefit to the college and a cheap and effective means of advertising for the makers and donors. This department should be made so complete that no student should be able to find in New England, at the time he graduates, any farm implement or machine of real value with the practical working of which he is unfamiliar, unless it be something of very recent origin.

The addition to the live stock of the farm, by recent gifts and by purchases made or in progress, will bring this important division into excellent condition for study, and leave little to be desired beyond the steady improvement which should result from careful management, judicious breeding, and the occasional infusion of fresh blood.

In the work of instruction in the agricultural department, it is the desire and intention of the officer in charge to constantly use the college farm, its soil, buildings, implements,

stock, crops, and operations for the purposes of observation, illustration, and practical demonstration. The students will be advised, from the time they enter college, to become familiar with the farm and everything connected with it, and to interest themselves in its current affairs. As far as practicable, every one will be led to assume the relation of adviser and assistant in its management, and, first in one line of work and then in another, to follow out all the details, with a full discussion of the whys and wherefores. The principles of business, as applied to farming, will be kept constantly in view. It is proposed to make, every autumn after the crops have been harvested, a complete inventory and appraisement of the college farm property. This will be done by the students; and then, by classes, all will be required to follow the expenditures and receipts through the ensuing year or more, with a complete journal of the farming operations and all matters which should be recorded. The practical lessons will not be impaired by the fact of things frequently done or left undone, because of the special purposes of *this* farm, the reasons for the same being fully explained.

During the past term, a new corn-crib was built. The students assisted in preparing the plans, estimating the storage capacity, making the bill of timber, procuring the materials, supervising the construction, and determining the cost. New animals in the various classes of pure-bred live stock will have to be entered in the appropriate herd-books and registers the present winter. This work will be divided among the students, who, under proper supervision, will be required to tabulate the pedigree, conduct the correspondence, perfect the papers, and secure the registration in every case. The work of each will be reported and explained to the rest of his class, and be subject to their inquiry and criticism. In the course of the coming season, another section of land will be thoroughly drained. Students will be expected to make the surveys, locate the drains, map the work, and assist in opening the ditches and laying the tiles.

The foregoing are merely examples of the way in which the farm can be practically used for supplementing the work of the lecture-room. This cannot be done unless the property is completely equipped in all its departments, liberally

maintained, and conducted with much greater diversity of operations than is consistent with farm economy in these days of division of labor and specialties in nearly every industrial pursuit.

At this industrial institution, however, Massachusetts does not attempt to pursue the business of farming for direct and immediate profit. That is not the purpose of the college in whole or in part, or of the State in maintaining it. It is rather to liberally provide here the facilities for thoroughly and broadly training some of her sons to apply, in active life, those principles which underlie progressive and profitable farming.

HENRY E. ALVORD.

ZOOLOGICAL DEPARTMENT.

Since my connection with the college, numerous requests have been made for information about the habits of some of our injurious insects, and the best means of checking their ravages. In order to give the information as wide a circulation in the State as possible, I have prepared the following account of some of those to which my attention has been most frequently called.

THE ASPARAGUS BEETLE.

Crioceris Asparagi, Linn.

This insect, which has been known in Europe for more than a hundred years, first made its appearance in this

country in the vicinity of New York in 1858, and in a very short time spread to the asparagus fields of Long Island, where it was estimated to have caused a loss of \$50,000 in one county in a single year. It has now distributed itself very generally through New Jersey, portions of New York, Connecticut, and

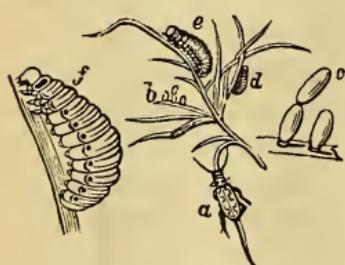


FIG. 1.—The Asparagus Beetle with its eggs and larvæ of the natural size; also, the eggs and larvæ enlarged.

Massachusetts, and in time will undoubtedly spread over the entire country wherever asparagus is raised.

These beetles hibernate, in the mature state, in sheltered places, under the bark of trees, in crevices of fence rails, under the clapboards of buildings, or in any place where they can find protection. As soon as the first shoots of asparagus appear in spring, the beetles awake from their winter sleep, and commence to feed on the tender tips of the plants. The sexes soon pair, and the females deposit their eggs at first on the surface of the shoots; but, after the plants are grown, they deposit them on the leaves near the end of the delicate branches.

The eggs (Fig. 1) are oval in outline, about one-sixteenth of an inch long, nearly black in color, and attached to the plant by one end; and they are usually in rows of from two to seven. In from seven to ten days, the eggs hatch, and the larvæ feed and reach their growth in from ten to fourteen days, when they are about one-fourth of an inch long, of a dull ash gray color, with the head and legs black and shining, and there are two black spots on the upper side of the segment following the head. When fully grown, they descend to the ground, where they spin their slight cocoons under the leaves or other rubbish, and transform to pupæ, in which stage they remain about ten days, when the perfect beetles emerge; and, after pairing, the females lay their eggs for a second generation. The round of life is so short that there is time for two, if not three, generations each year. The perfect beetle is one-fourth of an inch long. The head, antennæ, legs, and under side of the body are of a greenish black color; the prothorax, reddish, with a dark spot on each side of the middle; and the wing-covers are bluish black, broadly edged with reddish yellow, with three lemon yellow spots on each,—one on the base, the second a little before the middle, and the third beyond the middle. The second and third spots are nearly square, with one side touching the yellow edge of the wing-cover.

The remedies suggested by European entomologists, where this insect has been known so many years, are to pick them off by hand, or shake them off into a pan of water, when they may be killed by crushing them or by putting them into boiling water. This method can be useful only where small quantities of asparagus are raised. Dr. Fitch, who investigated their habits in 1863, recommended that fowls

be turned into the asparagus field and allowed to range over it, that they might destroy these insects of which they are so fond. Mr. A. S. Fuller states in the "American Entomologist" that for sixteen years he used freshly slaked lime, dusting it over the plants in the morning while the dew was on; and this application was so effectual in keeping the asparagus beetle in check that about one application every alternate season was sufficient. Many gardeners are in the habit of cutting down all the young seedlings in the spring when the beetles are emerging from their winter quarters, thus forcing them to lay their eggs only on the new shoots. As these are cut for market nearly every day, the eggs do not have time to hatch, and therefore no second generation will appear, except a few that may feed on stray plants outside of the field in waste places; and these should always be destroyed. It has been recommended to cut down all the seed stems as soon as the asparagus season is over, and to repeat the process once or twice during the season. Mr. H. H. Sargent states in the "Gardener's Monthly" that the earliest, largest, and best asparagus in his neighborhood was grown by this method of treatment, and that it had been continued for five successive years.

THE BUFFALO CARPET BEETLE.

Anthrenus scrophulariae, Linn.

This insect has been doing much damage in some parts of the State, and frequent inquiries have been made concerning its history and habits, as well as the best means of holding it in check. It was first described by Linnaeus in 1758, in the tenth edition of his "Systema Naturæ"; and he gave it the above specific name because the insect was known to feed in Europe on the blossoms of plants belonging to the genus *Scrophularia*. Noerdlinger, in his "Die Kleinen Feinde der Landwirthschaft," published in 1855, calls it the Common Flower Beetle, and says it is especially common on fruit trees and roses, and also that it is common in houses, where it is destructive to furs, clothes, animal collections, and even leather and dried plants. Herbst, in his work on the beetles, published in 1779, says: "This beetle is everywhere common in rooms, on buds, and especially

common on tulips. It destroys collections of insects and plants. The larvæ live in houses and destroy all kinds of collections of natural objects, as clothes, furs, leather, and victuals."

Although, as shown above, this insect has been known in Europe for more than a hundred years, it was not reported in this country until 1850, when Dr. LeConte found a variety of it on flowers in California. Dr. LeConte suggested that it might have been imported into California from Southern Europe during the Spanish occupation of that country. Prof. Lintner says the name "buffalo bug" was given to it on the Pacific coast, probably because of the fancied resemblance of the larva to the buffalo.

In the Eastern States, they are reported to have been first discovered in 1872 in Buffalo, N.Y., and very soon after in Massachusetts. Dr. Hagen learned upon inquiry that many of the infested carpets in and around Boston came from one large carpet store in that city; and it is, therefore, very probable that they were brought from Europe in imported carpets. It has often been stated that they were first introduced in 1876, in carpets brought from Europe to the Centennial Exposition in Philadelphia; but this is a mistake. It has frequently been reported that this insect does not confine itself to woollen fabrics, but also attacks cotton and silk. This, I think, must be a mistake; for those which I have been breeding during the past year have refused to eat cotton or silk, and, when supplied with mixed goods, they ate out the fibres of wool, leaving the cotton and silk intact. Others have had similar experience with them. This part of the subject, however, should receive further investigation.

Figure 2 represents the several stages of this carpet beetle, very much enlarged, the hair lines at the side indicating the true length. The mature larva represented at *a* is nearly one-fourth of an inch long, and clothed with coarse brown hairs, which are arranged somewhat in tufts on the head and along the side; while at the posterior end they are extended into a tail-like appendage. In September and October, the larva transforms into a pupa, *c*, which, however, is retained within the skin of the larva till the transformations are completed, and the perfect beetle emerges through a rent along the middle of the back, as shown at *b*. The

perfect beetle, *d*, is ovate and moderately convex. The head is black, with a few orange-red scales around the eyes and above the mouth. The antennæ are black, eleven-jointed, terminated by a broadly oval three-jointed club, which is as long as all the preceding joints united. The thorax is black, with the sides and base more or less covered with orange scales. The wing-covers are black ; but the suture is broadly red, with three equidistant, lateral projections of the same color, the first two of which join sinuous, white, imperfectly defined bands. The posterior is obscurely connected with a red spot at the end of the wing-cover, and there is usually a small white spot at the base. The under side of the body

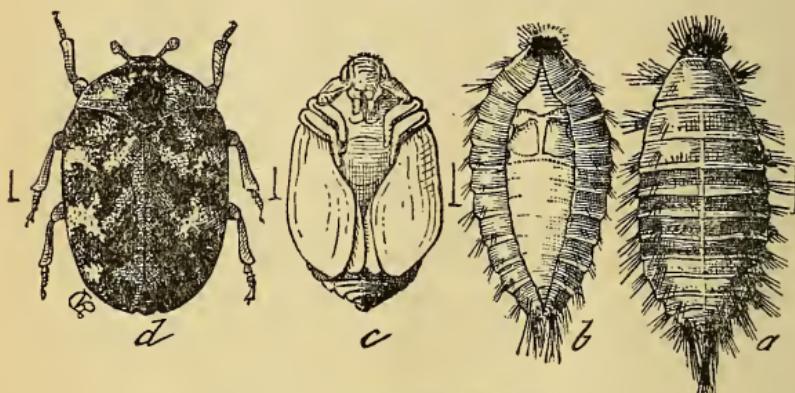


FIG. 2.—The Buffalo Carpet Beetle.

is black, more or less covered with red and white scales. Length, from one-seventh to one-eleventh of an inch. The colors are subject to considerable variation. The red band along the middle of the back is sometimes replaced by white ; and the first two bands of white on the wing-covers are run together, forming one broad white band.

These insects attack the exposed edges of the carpets ; and wherever they can make their way underneath, especially along the cracks of the floor, they often divide the carpet as neatly as it can be done with a pair of scissors. They are, undoubtedly, very difficult insects to exterminate ; for the ordinary applications of camphor, pepper, tobacco, turpentine, carbolic acid, etc., produce no effect on them. Benzine or kerosene oil used freely in all the cracks and crevices of the floor will destroy them in all their stages if brought in contact with them ; and the odor of benzine, if

sufficiently strong, will kill the larvæ and perfect beetles. Tarred paper under the carpets, naphthaline, gasoline, and bisulphide of carbon have all been recommended; but their disagreeable odor and the explosive properties of the last two render them undesirable. When furniture is infested, it should be removed to an out-building, where there is no fire, and thoroughly treated with benzine or gasoline. The furniture should not be returned to the house till the liquid has entirely evaporated and there is no odor. One of the best remedies for infested carpets is to spread a wet cloth along the edge or over any part where the pests are supposed to be at work, and run a hot flat-iron over it, so that the hot steam penetrating through the carpet may destroy them. This work must be very thoroughly and carefully done, to insure success. When woollen garments are put away for the summer, they should be packed in tight boxes with paper pasted over every crack where one of these minute insects could possibly gain an entrance. If there is any danger that these garments are infested before packing them away, they should first be treated with benzine.

THE PITCHY CARPET BEETLE.

Attagenus piceus, Oliv.

Several persons have sent me larvæ of this beetle, which they found feeding on their carpets. The full-grown larva is rather more than a quarter of an inch long, of a brownish color, ringed with whitish between the segments, largest near the anterior end and gradually tapering towards the posterior, which is provided with a loose pencil of long diverging hairs. The whole surface of the body is covered with short, coarse brown hairs, which are so arranged as to give a smooth and somewhat glossy appearance to the larva. The perfect beetle is from one-fifth to one-seventh of an inch long, more elongated than the buffalo carpet beetle, and varies in color from a light pitchy brown to dark brown, without spots or markings.

Specimens of this larva were sent to me two years ago last June, from which the perfect beetles did not emerge till the following spring; and therefore there can be but one generation in a year, at least in the Northern States. It has

been suggested that this insect is destructive to silk and cotton; but this needs verification, and I would be glad to have living specimens forwarded to me for further investigation.

THE TWO-SPOTTED LADY BIRD.

Adalia bipunctata, Linn.

Among the insects sent me as carpet beetles, none have been received more frequently than this species, which seems to be exceedingly common throughout the Connecticut valley. The eggs are bright orange in color, and are laid in small clusters on the leaves of plants infested with plant lice, upon which the larvæ and perfect beetles feed. The mature larva is about three-eighths of an inch long, of a dull, bluish black color, with ill-defined orange spots on the segments, which are somewhat roughened by tubercles. The perfect beetle is about one-fourth of an inch long and nearly hemispherical in form. The wing-covers are red, with a black spot on the middle of each. The thorax is white, with a black stripe on each side of the middle; and these are joined by a prolongation obliquely backward from the middle of each. The head is black, with a white spot on each side in front of the eye; and the under side of the body is black.

These beetles came into the houses in such numbers, in some places, as to cause alarm lest they were veritable carpet beetles. I have not yet investigated their habits enough to make sure whether they destroy the larvæ of carpet beetles; but it would seem a rather difficult task, if not impossible, for them to grapple with and destroy such hairy larvæ. Those which I have bred were fed on plant lice, and the number which one of these larvæ will devour in a day is perfectly astonishing. The amount of good these little pigmy friends do in destroying the lice on our various plants is beyond all calculation. Nor do they confine themselves to plant lice, for they feed on the eggs of other insects. The perfect beetle of this species has often been found in Maine, feeding on the eggs of the Colorado potato beetle.

CHARLES H. FERNALD.

CALENDAR FOR 1887.

January 5, Wednesday, winter term begins, at 8.15 A.M.

March 25, Friday, winter term closes, at 10.30 A.M.

April 5, Tuesday, summer term begins, at 8.15 A.M.

June 19, Sunday,	{ Baccalaureate Sermon. Address before the Christian Union.
Monday, June 20,	{ Grinnell Prize Examination of the Senior Class in Agriculture. Military Exercises. Kendall Prize Speaking.
June 21, Tuesday,	{ Meeting of the Alumni. Military Exercises. Commemorative Exercises appropriate to the 25th Anniversary of the Congressional En- dowment of Agricultural Colleges. Dinner of Alumni and Guests. President's Reception.

June 22, Wednesday, Commencement Exercises.

June 23, Thursday, Examinations for admission, at 9 A.M., Botanic
Museum.

September 6, Tuesday, Examination for admission, at 9 A.M.

September 7, Wednesday, fall term begins, at 8.15 A.M.

December 16, Friday, fall term closes, at 10.30 A.M.

1888.

January 4, Wednesday, winter term begins, at 8.15 A.M.

March 25, Friday, winter term closes, at 10.30 A.M.

THE CORPORATION.

	Term expires
HENRY COLT, OF PITTSFIELD,	1890
PHINEAS STEDMAN, OF CHICOPEE,	1890
DANIEL NEEDHAM, OF GROTON,	1889
JAMES S. GRINNELL, OF GREENFIELD,	1891
GEORGE NOYES, OF BOSTON,	1888
J. HOWE DEMOND, OF NORTHAMPTON,	1891
WILLIAM H. BOWKER, OF BOSTON,	1890
ARTHUR A. BRIGHAM, OF MARLBOROUGH,	1890
WILLIAM R. SESSIONS, OF HAMPDEN,	1889
THOMAS P. ROOT, OF BARRE,	1891
JOSEPH A. HARWOOD, OF LITTLETON,	1891
ELIJAH W. WOOD, OF NEWTON,	1888
FRANCIS H. APPLETON, OF PEABODY,	1892
WILLIAM WHEELER, OF CONCORD,	1892

Members Ex-Officiis.

HIS EXCELLENCE GOVERNOR OLIVER AMES, *President of the Corporation.*

HENRY H. GOODELL, *President of the College.*

JOHN W. DICKINSON, *Secretary of the Board of Education.*

JOHN E. RUSSELL, *Secretary of the Board of Agriculture.*

Committee on Finance and Buildings.

JAMES S. GRINNELL. HENRY COLT.

J. HOWE DEMOND. GEORGE NOYES.

DANIEL NEEDHAM, *Chairman.*

Committee on Course of Study and Faculty.

THOMAS P. ROOT. WILLIAM H. BOWKER.

ARTHUR A. BRIGHAM. HENRY H. GOODELL, *Chairman.*

Committee on Farm and Horticultural Departments.

PHINEAS STEDMAN. JOSEPH A. HARWOOD.

WILLIAM R. SESSIONS. ELIJAH W. WOOD.

JOHN E. RUSSELL, *Chairman.*

JAMES S. GRINNELL, OF GREENFIELD,
Vice-President of the Corporation.

GEORGE NOYES, OF BOSTON, *Secretary.*

FRANK E. PAIGE, OF AMHERST, *Treasurer.*

HENRY COLT, OF PITTSFIELD, *Auditor.*

Board of Overseers.

THE STATE BOARD OF AGRICULTURE.

Examining Committee of Overseers.

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WILLIAM R. SESSIONS,	OF HAMPDEN.
DANIEL E. DAMON,	OF PLYMOUTH.
ATKINSON C. VARNUM,	OF LOWELL.
HENRY L. WHITING,	OF WEST TISBURY.

The Faculty.

HENRY H. GOODELL, M.A., *President,*
Professor of Modern Languages and English Literature.

LEVI STOCKBRIDGE,
Professor of Agriculture, Honorary.

CHARLES A. GOESSMANN, Ph.D.,
Professor of Chemistry.

SAMUEL T. MAYNARD, B.Sc.,
Professor of Botany and Horticulture.

CLARENCE D. WARNER, B.Sc.,
Professor of Mathematics and Physics.

CHARLES WELLINGTON, Ph.D.,
Associate Professor of Chemistry.

HENRY E. ALVORD, C.E.,
Professor of Agriculture.

CHARLES H. FERNALD, Ph.D.,
Professor of Zoölogy and Lecturer on Veterinary Science.

REV. CHARLES S. WALKER, Ph.D., *College Pastor,*
Professor of Mental and Political Science.

GEORGE E. SAGE. 1ST LT. 5TH ART., U.S.A.,
Professor of Military Science and Tactics.

FREDERICK TUCKERMAN, M.D.,
Lecturer on Anatomy and Physiology.

JOHN M. TYLER, M.A.,
Lecturer on Zoölogy.

ROBERT W. LYMAN, LL.B.,
Lecturer on Farm Law.

JOHN W. LANE, M.A.,
Instructor in Elocution.

HENRY H. GOODELL, M.A., *Librarian.*

Graduates of 1886.*

Ateshian, Osgan Hagope (Boston Univ.),	Sivas, Turkey.
Atkins, William Holland,	Westfield.
Ayres, Winfield (Boston Univ.),	Oakham.
Carpenter, David Frederic,	Millington.
Clapp, Charles Wellington,	Montague.
Duncan, Richard Francis (Boston Univ.), . .	Williamstown.
Eaton, William Alfred,	Piermont-on-Hudson, N.Y.
Felt, Chas. Frederic Wilson (Boston Univ.),	Northborough.
Mackintosh, Richards Bryant " "	Dedham.
Sanborn, Kingsbury (Boston Univ.),	Lawrence.
Stone, George Sawyer (Boston Univ.),	Otter River.
Woolson, George Clark ('71),	Passaic, N.J.
Total,	12

*The Annual Report, being made in January, necessarily includes parts of two academic years; and the catalogue bears the names of such students as have been connected with the college during any portion of the year 1886.

Senior Class.

Allen, Frederick Cunningham,	. . . . .	West Newton.
Almeida, Augusto Luis de,	. . . . .	Bananal, Sao Paulo, Brazil.
Ball, William Monroe,	. . . . .	Amherst.
Barrett, Edward William,	. . . . .	Milford.
Brown, Frederick Willard,	. . . . .	West Medford.
Caldwell, William Hutson,	. . . . .	Peterborough, N.H.
Carpenter, Frank Berton,	. . . . .	Leyden.
Chase, William Edward,	. . . . .	Warwick.
Clarke, Frank Scripture,	. . . . .	Lowell.
Davis, Fred Augustus,	. . . . .	Lynn.
Fisherwick, Cyrus Webster,	. . . . .	Monson.
Flint, Edward Rawson,	. . . . .	Boston.
Fowler, Fred Homer,	. . . . .	North Hadley.
Howe, Clinton Samuel,	. . . . .	Marlborough.
Kinney, Arno Lewis,	. . . . .	Lowell.
Marsh, James Morrill,	. . . . .	Lynn.
Marshall, Charles Leander,	. . . . .	Lowell.
Martin, Joseph,	. . . . .	Marblehead.
Meehan, Thomas Francis Benedict,	. . . . .	Boston.
Osterhout, J. Clark,	. . . . .	Lowell.
Rice, Thomas, 2d,	. . . . .	Shrewsbury.
Richardson, Evan Fussell,	. . . . .	East Medway.
Rideout, Henry Norman Waymouth,	. . . . .	Quincy.
Tolman, William Nichols,	. . . . .	Concord.
Torelly, Firmino da Silva,	. . . . .	Rio Grande do Sul, Brazil.
Watson, Charles Herbert,	. . . . .	Groton.
White, Herbert Judson,	. . . . .	Wakefield.
Total,	. . . . .	27

Junior Class.

Belden, Edward Henry,	. . . . .	North Hatfield.
Bliss, Herbert Charles,	. . . . .	Attleborough.
Brooks, Frederick Kimball,	. . . . .	Haverhill.
Cooley, Fred Smith,	. . . . .	Sunderland.
Cutler, George Washington,	. . . . .	Waltham.
Dickinson, Edwin Harris,	. . . . .	North Amherst.
Dole, Edward Johnson,	. . . . .	Chicopee.
Field, Samuel Hall,	. . . . .	North Hatfield.
Foster, Francis Homer,	. . . . .	Andover.
Hayward, Albert Irving,	. . . . .	Ashby.
Holt, Jonathan Edward,	. . . . .	Andover.
Kinney, Lorenzo Foster,	. . . . .	Worcester.
Knapp, Edward Everett,	. . . . .	East Cambridge.
Loomis, Herbert Russell,	. . . . .	North Amherst.
Mishima, Yataro,	. . . . .	Tokio, Japan.
Moore, Robert Bostwick,	. . . . .	Framingham.
Newman, George Edward,	. . . . .	Newbury.

Noyes, Frank Frederick,	South Hingham.
Parsons, Wilfred Atherton,	Southampton.
Shepardson, William Martin,	Warwick.
Shimer, Boyer Luther,	Redington, Pa.
White, Henry Kirke,	Whately.
Worthington, Alvan Fisher,	Dedham.
Total,	23

Sophomore Class.

Adams, George Albert,	Winchendon.
Alger, George Ward,	West Bridgewater.
Alger, Isaac, Jr.,	Attleborough.
Blair, James Roswell,	Warren.
Bliss, Clinton Edwin,	Attleborough.
Colcord, Wallace Rodman,	Dover.
Copeland, Arthur Davis,	Campello.
Crocker, Charles Stoughton,	Sunderland.
Davis, Franklin Ware,	Tamworth, N.H.
Hartwell, Burt Laws,	Littleton.
Hubbard, Dwight Lauson,	Amherst.
Huse, Frederick Robinson,	Winchester.
Hutchings, James Tyler,	Amherst.
Kellogg, William Adams,	North Amherst.
Miles, Arthur Lincoln,	Rutland.
Okami, Yoshiji,	Tokio, Japan.
Sellew, Robert Pease,	East Longmeadow.
Smith, James Robert,	Walpole.
Sprague, William Arnold,	Chepachet, R.I.
Wentworth, Elihu Francis,	Canton.
White, Louis Allis,	Whately.
Whitney, Charles Albion,	Upton.
Total,	22

Freshman Class.

Barry, David,	Southwick.
Braman, Samuel Noyes,	Wayland.
Castro, Arthur de Moraes e,	Juiz de Fora Minas, Brazil.
Dickinson, Dwight Ward,	Amherst.
Felton, Truman Page,	Berlin.
Frost, William Lawrence,	Boston.
Fuller, Edward Abijah,	North Andover.
Goddard, George Andrews,	Turner's Falls.
Gregory, Edgar,	Marblehead.
Haskins, Henry Darwin,	North Amherst.
Herrero, José Maria,	Jovellanos, Cuba.
Hogan, Frederick William,	Greenville, N.Y.
Jones, Charles Howland,	Downer's Grove, Ill.
Loring, John Samuel,	Shrewsbury.
McCloud, Albert Carpenter,	Amherst.

Maynard, John Bowen,	Northampton.
Mossman, Fred Way,	Westminster.
North, Mark Newell,	Boston.
Nourse, Arthur Merriam,	Westborough.
Pearson, George Gowing,	Reading.
Plumb, Frank Herbert,	Westfield.
Russell, Fred Newton,	Sunderland.
Russell, Henry Lincoln,	Sunderland.
Simonds, George Bradley,	Ashby.
Smith, Frederic Jason,	North Hadley.
Stillings, Levi Chamberlain,	Medford.
Stowe, Arthur Nelson,	Hudson.
Stratton, Eddie Nathan,	Marlborough.
Taft, Walter Edward,	Dedham.
Taylor, Fred Leon,	Amherst.
Thayer, Bernard,	Randolph.
West, John Sherman,	Belchertown.
Whitcomb, Nahum Harwood,	Littleton.
Williams, Arthur Sanderson,	Sunderland.
Williams, Frank Oliver,	Sunderland.
Woodbury, Herbert Elwell,	Gloucester.
Total,	36

Resident Graduates at the College and Experiment Station.

Allen, B.Sc., Edwin West (Boston Univ.),	Amherst.
Crandall, B.Sc., Charles Spencer (Michigan State Agricultural College),	Lansing, Mich.
Fellows, B.A., George Stevens (Amherst College),	Agricultural College, Md.
Green, B.Sc., Samuel Bowdlear (Boston Univ.),	Amherst.
Jacqueth, Isaac Samuel,	Amherst.
Kingman, B.Sc., Morris Bird,	Amherst.
Nourse, B.Sc., David Oliver (Boston Univ.),	Bolton.
Phelps, B.Sc., Charles Shepard (Boston Univ.),	Florence.
Smith, B.Sc., Llewellyn,	Amherst.
Stone, B.Sc., Winthrop Ellsworth,	Amherst.
Wheeler, B.Sc., Homer Jay (Boston Univ.),	Bolton.
Total,	11

Summary.

Resident Graduates,	11
Graduates of 1886,	12
Senior Class,	27
Junior Class,	23
Sophomore Class,	22
Freshman Class,	36
Total,	131

COURSE OF STUDY.

FRESHMAN YEAR.

	Agriculture.	Botany and Horticulture.	Chemistry.	Zoölogy.	Mathematics.	Languages.	Drawing and Composition.	Military Drill.	Departments requiring extra time for practical work.
Fall, . .				Physical Geography,—3.	Algebra,—5.	Latin,—4.	Composition,—1.	3*	Botany, Agriculture.
	Climatology, or relations of Weather and Farming,—2.	Botany, Structural,—5.*		Anatomy and Physiology,—5.	Algebra and Geometry,—5.	Latin,—4.	Free-hand Drawing,—5.*	3*	.....
Winter, .	Book-keeping. Farm Accounts,—2.					Geometry,—5.	Composition,—1.	3*	Botany.
SOPHOMORE YEAR.									
Fall, . .	Soils, Tillage. Drainage,—5.*	Botany, Economic,—5.	Chemistry, Principles, and Metalloids —5.	.....	Trigonometry,—4.	French,—5.	Composition,—1.	3*	Agriculture.
Winter, .	Mixed Farming. Rotation of Crops,—3.	Metals,—5.	.....	.....	Mensuration, —4.	French,—5.	Mechanical Drawing,—5.*	3*	.....
Summer, .	Manures,—5.	Horticulture,—5.	Mineralogy,—3.	.....	Surveying,—4.	French,—3.	Composition,—1.	3*	Surveying.

JUNIOR YEAR.

Fall, . . .	Farm Implements, Harvesting and Storing Crops,—2. Market Gardening,—3.*	Geology,—5.	Zoology,—3.*	Mechanics, Draft, Friction, etc.,—3.	Rhetoric,—2.	Composition,—1.	3*	Horticulture, Zoölogy,
Winter, . . .	Preparation and Transportation of Crops. Markets,—2.	Laboratory Work, —5.	Zoology,—3.	Physics, Sound, Heat,—5.	English Literature,—5.	Composition,—1.	3*	.....
Summer, . . .	Special Crops. Farm Roads,—1.	Forestry and Land-scape Gardening, —3.*	Laboratory Work, —5.*	Entomology,—4.*	English Literature,—4.	Composition,—1.	3*	Chemistry, Entomology.

SENIOR YEAR.

Fall, . . .	Live stock, Breeding, and Care,—3.	Laboratory Work, Chemistry of Fertilizers,—10.*	Comp. Anatomy of Domestic Animals,—4.*	Veterinary Science, —5.	Mental Science,—5.	Composition and Debate,—1.	3*	Agriculture, Composition, Anatomy.
Winter, . . .	Dairy Farming,—3.	Lectures, Law, etc.	Organic,—3.	Meteorology, —3.	Political Economy, —5.	Composition and Debate,—1.	3*	Agriculture.
Summer, . . .	Agricultural Review. Discussions,—3.	Chemical Industries, —3.	Geology,—2.	Constitutional History,—5.	Composition —1.	Composition —1.	3*	Agriculture, Natural History.

* Afternoon exercises or those requiring additional time marked (*) after the figures denoting hours per week.

TEXT BOOKS.

- BARNARD — "Talks about the Weather."
- PACKARD — "Manual of Book-keeping."
- MORTON — "Soil of the Farm."
- GREGORY — "Fertilizers."
- MILES — "Stock-breeding."
- GRAY — "Manual of Botany."
- BESSEY — "Botany for High Schools and Colleges."
- FULLER — "Practical Forestry."
- MAYNARD — "Practical Fruit Grower."
- SCOTT — "Rural Homes."
- AVERY — "Elements of Chemistry."
- WILLS — "Tables for Qualitative Chemical Analysis."
- WHEELER — "Medical Chemistry."
- DANA — "Manual of Mineralogy and Lithology."
- BRUSH — "Determinative Mineralogy and Blow-pipe."
- GUYOT — "Physical Geography."
- WELLS — "University Algebra."
- WENTWORTH — "Geometry."
- WELLS — "Trigonometry."
- WARNER — "Mensuration."
- DAVIES — "Surveying."
- DANA — "Mechanics."
- ATKINSON-GANOT — "Physics."
- LOOMIS — "Meteorology."
- HARKNESS — "Latin Grammar and New Reader."
- WHITNEY — "French Grammar."
- GENUNG — "Practical Elements of Rhetoric."
- KELLOGG — "English Literature."
- PORTER — "Elements of Intellectual Science."
- WALKER — "Political Economy."
- MACY — "Our Government."
- WHITE — "Progressive Art Studies." Elementary and Instrumental.

To give not only a practical, but a liberal education is the aim in each department; and the several courses have been so arranged as to best subserve that end. Weekly exercises in composition and declamation are held throughout the course. The instruction in agriculture and horticulture is both theoretical and practical. A certain amount of labor is required of each student, and the

lessons of the recitation-room are practically enforced in the garden and field. Students are allowed to work for wages during such leisure hours as are at their disposal. Under the act by which the college was founded, instruction in military tactics is made imperative ; and each student, unless physically debarred, is required to attend such exercises as are prescribed, under the direction of a regular army officer stationed at the college.

ADMISSION.

Candidates for admission to the Freshman Class are examined orally and in writing, upon the following subjects : English Grammar, Geography, Arithmetic, Algebra to quadratic equations, the Metric System, and the History of the United States.

Candidates for higher standing are examined as above, and also in the studies gone over by the class to which they may desire admission.

No one can be admitted to the college until he is fifteen years of age. Every applicant is required to furnish a certificate of good character from his late pastor or teacher. Candidates are requested to furnish the Examining Committee with their standing in the schools they have last attended. The previous rank of the candidate will be considered in admitting him. The regular examinations for admission are held at the Botanic Museum, at nine o'clock A.M., on Thursday, June 23, and on Tuesday, September 6; but candidates may be examined and admitted at any other time in the year.

DEGREES.

Those who complete the course receive the degree of Bachelor of Science, the diploma being signed by the Governor of Massachusetts, who is president of the corporation.

Regular students of the college may also, on application, become members of Boston University, and upon graduation receive its diploma in addition to that of the college, thereby becoming entitled to all the privileges of its alumni.

EXPENSES.

Tuition in advance.

Fall term,	• • • • .	\$30.00
Winter term,	• • • • .	25.00
Summer term,	• • • • .	25.00
Room rent, in advance, \$5.00 to \$16.00 per term,	• .	15.00 48.00
Board, \$2.50 to \$5.00 per week,	• • • .	95.00 190.00
Fuel, \$5.00 to \$15.00 per year,	• .	5.00 15.00
Washing, 30 to 60 cents per week,	•	11.40 22.80
Military suit,	•	30.00 30.00
Expense per year,	•	<hr/> \$236.40 \$385.80

Board in clubs has been two dollars and fifty cents per week ; at the college boarding-house, three dollars and fifty cents ; in private families, four to five dollars. The military suit must be obtained immediately upon entrance at college, and used in the drill exercises prescribed. For the use of the laboratory in practical chemistry there will be a charge of ten dollars per term used. Some expense will also be incurred for lights and for text-books. Students whose homes are within the State of Massachusetts can in most cases obtain a scholarship by applying to the senator of the district in which they live. The outlay of money can be further reduced by work during leisure hours on the farm or in the botanic department. Applications should be made to the professors in charge of said departments. The opportunities for work are more abundant during the fall and summer terms.

SIZE OF ROOMS.

For the information of those desiring to carpet their rooms, the following measurements are given. In the new south dormitory, the study-rooms are about fifteen by fourteen feet, with a recess seven feet four inches by three feet ; and the bedrooms are eleven feet two inches by eight feet five inches. This building is heated by steam. In the north dormitory, the corner rooms are fourteen by fifteen feet, and the annexed bedrooms eight by ten feet. The inside rooms are thirteen feet and a half by fourteen feet and a half, and the bedrooms eight by eight feet. A coal stove is furnished with each room.

THE ROBINSON SCHOLARSHIP.

The income of the Robinson Fund of one thousand dollars, the bequest of Miss Mary Robinson, of Medfield, is assigned by the faculty to such student requiring aid as they deem most worthy.

CONGRESSIONAL SCHOLARSHIPS.

The trustees voted in January, 1878, to establish one free scholarship for each of the eleven congressional districts of the State. Applications for such scholarships should be made to the representative from the district to which the applicant belongs. The selection for these scholarships will be determined as each member of Congress may prefer ; but, where several applications are sent in from the same district, a competitive examination would seem to be desirable. Applicants should be good scholars, of vigorous constitution, and should enter college with the intention of remaining through the course, and then engaging in some pursuit connected with agriculture.

STATE SCHOLARSHIPS.

The Legislature of 1883 passed the following Resolve in favor of the Massachusetts Agricultural College:—

Resolved, That there shall be paid annually, for the term of four years, from the treasury of the Commonwealth to the treasurer of the Massachusetts Agricultural College, the sum of ten thousand dollars, to enable the trustees of said college to provide, for the students of said institution, the theoretical and practical education required by its charter and the law of the United States relating thereto.

Resolved, That annually, for the term of four years, eighty free scholarships be and hereby are established at the Massachusetts Agricultural College, the same to be given by appointment to persons in this Commonwealth, after a competitive examination, under rules prescribed by the president of the college at such time and place as the senator then in office from each district shall designate; and the said scholarships shall be assigned equally to each senatorial district. But, if there shall be less than two successful applicants for scholarships from any senatorial district, such scholarships may be distributed by the president of the college equally among the other districts, as nearly as possible; but no applicant shall be entitled to a scholarship unless he shall pass an examination in accordance with the rules to be established as herein-before provided.

The Legislature of 1886 passed the following Resolve, making perpetual the scholarships established:—

Resolved, That annually the scholarships established by chapter forty-six of the Resolves of the year eighteen hundred and eighty-three be given and continued in accordance with the provisions of said chapter.

In accordance with these resolves, any one desiring admission to the college can apply to the senator of his district for a scholarship.

EQUIPMENT.

AGRICULTURAL DEPARTMENT.

For the equipment of this department, see the Inventory of the Farm, Implements, Stock, etc.

BOTANICAL DEPARTMENT.

Botanic Museum.—This contains the Knowlton Herbarium, consisting of over ten thousand species of plants from nearly all parts of the world; a collection of models of nearly all of the leading varieties of apples and pears; a large collection of specimens of wood, cut so as to show their individual structure; numerous models of tropical and other fruits; specimens of abnormal and peculiar forms of stems, fruits, vegetables, etc.; many inter-

esting specimens of unnatural growths of trees and plants, natural grafts, etc.; together with many specimens and models, prepared for illustrating the growth and structure of plants, and including a model of the "giant squash," which raised by its expansive force the enormous weight of five thousand pounds.

The Botanic Recitation Room, in the same building, is provided with three thousand diagrams and charts illustrating structural and systematic botany; also nine compound microscopes of R. B. Tolles' make, with objectives, ranging from four inch to one eight inch focal length. In the study of structural botany, the students become familiar with the use of the compound microscope, and see the objects studied for themselves, special attention being given to the practical study of the structure and growth of the common plants, cultivated in the greenhouse, garden, or on the farm.

Conservatories.—The Durfee Conservatory, the gift of the Hon. Nathan Durfee, and the adjoining propagating house, the gift of the Hon. William Knowlton, contain a large collection of plants especially adapted to illustrate the principles of structural, systematic, and economic botany, together with all the leading plants used for house culture, cut flowers, and out-door ornamentation. Here instruction is given in methods of propagation, cultivation, training, varieties, etc., by actual practice, each student being expected to do all the different kinds of work in this department. These houses are open at all times to the public and students, who may watch the progress of growth and methods of cultivation.

Fruits.—The orchards, of ten to fifteen acres, contain all the standard varieties of apples, pears, peaches, plums, cherries, etc., in bearing condition. Several acres of small fruits are also grown for the markets. The vineyard, of one and one-half acres, contains from thirty to forty varieties of fully tested kinds of grapes. New varieties of all the above fruits are planted in experimental plats, where their merits are fully tested. All varieties of fruits, together with the ornamental trees, shrubs, and plants, are distinctly labelled, so that students and visitors may readily study their characteristics. Methods of planting, training, pruning, cultivation, study of varieties, gathering and packing of fruits, etc., are taught by field exercises, the students doing a large part of the work in this department.

Nursery.—This contains more than twenty-five thousand trees, shrubs, and vines in various stages of growth, where the various methods of propagating by cuttings, layers, budding, grafting, pruning, and training of young trees are practically taught to the students.

Garden.— All kinds of garden and farm-garden crops are grown in this department for market, furnishing ample illustration of the treatment of all market-garden crops, special attention being given to the selection of varieties and the growth of seed. The income from the sales of trees, plants, flowers, fruits, and vegetables aids materially in the support of the department, and furnishes illustrations of the methods of business, with which all students are expected to become familiar.

Forestry.— Many kinds of trees suitable for forest planting are grown in the nursery; and plantations have been made upon the college grounds and on private property in the vicinity, in various stages of growth, affording good examples of this most important subject. A large grove in all stages of growth is connected with this department, where the methods of pruning forest trees and the management and preservation of forests can be illustrated.

NATURAL HISTORY DEPARTMENT.

The department of zoölogy is well supplied with microscopes and accessories necessary for the study of the lower forms of life and the tissue of the higher animals. The State collection of specimens illustrating the natural history of Massachusetts has been put on exhibition in the new cabinet, and is valuable for purposes of instruction. To this has recently been added a collection of skeletons, models, and stuffed animals, purchased from Prof. H. A. Ward, and a fine collection of corals presented by the Museum of Comparative Zoölogy in Cambridge.

MATHEMATICAL DEPARTMENT.

The instruction embraces pure mathematics, civil engineering, mechanics, and physics. For civil engineering there is an Eckhold's omnimeter, a solar compass, an engineer's transit, a surveyor's transit, two common compasses, two levels, a sextant, four chains, three levelling rods, and such other incidental apparatus as is necessary for practical field work. For mechanics there is a full set of mechanical powers, and a good collection of apparatus for illustration in hydrostatics, hydro-dynamics, and pneumatics. For physics, the apparatus is amply sufficient for illustrating the general principles of sound, heat, light, and electricity. Adjacent to a commodious lecture-room are a battery-room and the physical cabinet, to which latter has been lately added much valuable apparatus.

CHEMICAL DEPARTMENT.

This department has charge of instruction in general, agricultural, and analytical chemistry, and, at present, of that in mineral-

ogy and chemical geology. For demonstration and practical work in these subjects, the department is equipped as follows:—

For general chemistry, the lecture-room contains a series of thirty wall charts illustrative of chemical processes on the large scale, a series of seven wall charts showing the composition of food materials, and a collection of apparatus for demonstration on the lecture table. For agricultural chemistry there is on hand a good typical collection of raw and manufactured materials, illustrating fertilization of crops and the manufacture of fertilizers, a partial collection of grains and other articles of foods, and of their proximate constituents. For analytical chemistry there is a laboratory for beginners, in a capacious room, well lighted and ventilated, and furnished with fifty-two working tables, each table being provided with sets of reagents, wet and dry, a fume chamber, water, gas, draw, and locker, the whole arranged on an improved plan; a laboratory for advanced students, with eight tables, and provided with gas, water, fume chambers, drying baths, furnaces, two Becker analytical balances, and incidental apparatus. Both laboratories are supplied with collections of natural and artificial products used in analytical practice. For instruction in mineralogy, use is made of the larger chemical laboratory. A small collection of cabinet specimens and a collection of rough specimens for work in determinative mineralogy serve for practical study. For instruction in chemical geology, the laboratory possesses a collection of typical cabinet specimens.

LIBRARY.

This now numbers fifty-five hundred volumes, having been increased during the year, by a gift and a purchase, eleven hundred volumes. It has been moved into the new library building, and is made available to the general student for reference or investigation. It is especially valuable as a library of reference, and no pains will be spared to make it complete in the departments of agriculture, horticulture, and botany, and the natural sciences. It is open a portion of each day for consultation, and an hour every evening for the drawing of books.

PRIZES.

RHETORICAL PRIZES.

The prizes heretofore offered by Isaac D. Farnsworth, Esq., will this year be given by Hiram Kendall of the class of 1876. These prizes are awarded for excellence in declamation, and are open to competition, under certain restrictions, to members of the Sophomore and Freshman classes.

GRINNELL AGRICULTURAL PRIZES.

Hon William Clafin of Boston has given the sum of one thousand dollars for the endowment of a first prize and a second prize, to be called the Grinnell Agricultural Prizes, in honor of Geo. B. Grinnell, Esq., of New York. These prizes are to be paid in cash to those two members of the graduating class who may pass the best oral and written examination in theoretical and practical agriculture.

HILLS BOTANICAL PRIZES.

For the best herbarium collected by a member of the class of 1887, a prize of fifteen dollars is offered, and for the second best a prize of ten dollars; also, a prize of five dollars for the best collection of woods, and a prize of five dollars for the best collection of dried plants from the college farm.

THE CLARK PRIZE.

A prize of thirty dollars is offered annually for excellence in human anatomy and physiology, as exhibited in a written examination, and will be awarded to the writer judged worthy of such distinction. The prize is named in memory of the late Henry James Clark, the eminent biologist, who was the first professor of natural history at the college.

The prizes in June, 1886, were awarded as follows:—

Farnsworth Prizes.—1. To Albert Irving Hayward; 2. To Boyer Luther Shimer,—of the class of 1888. 1. To Burt Laws Hartwell; 2. To William Adams Kellogg,—of the class of 1889.

Grinnell Prizes.—1. To George Sawyer Stone; 2. To Charles Wellington Clapp,—of the class of 1886.

Hills Prizes.—No first prize awarded; 2. To Charles Wellington Clapp, of the class of 1886.

Clark Prize.—To Yataro Mishima, of the class of 1888.

RELIGIOUS SERVICES.

Students are required to attend prayers every week-day at 8.15 A.M., and public worship in the chapel every Sunday at 10.30 A.M., unless by request of their parents arrangements are made to attend divine service elsewhere. Further opportunities for moral and religious culture are afforded by a Bible class taught at the close of the Sunday morning service, and by religious meetings held on Sunday afternoon and during the week, under the auspices of the Young Men's Christian Union.

LOCATION.

Amherst is on the New London Northern Railroad, connecting at Palmer with the Boston & Albany Railroad, and at Miller's Falls with the Fitchburg Railroad. It is confidently expected that within two or three months the Central Massachusetts Railroad will have been completed to Amherst, and a through line secured to Boston and towns in its vicinity. A stage route of seven miles connects Amherst at Northampton with the Connecticut River Railroad and with the New Haven & Northampton Railroad. The college buildings are on a healthful site, commanding one of the finest views in New England. The large farm of three hundred and eighty-three acres, with its varied surface and native forests, gives the student the freedom and the quiet of a country home.

INVENTORY OF STATE PROPERTY

AT THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

DECEMBER 31, 1886.

FARM INVENTORY, DEC. 31, 1886.

LIVE STOCK — *Horses.*

1 pair roan mares, 4 and 5 years old,	\$500.00
1 roan horse, 5 years old,	200.00
1 gray horse, 9 years old,	200.00
Four (4) horses,— total,	<u>\$900.00</u>

Cattle — Ayrshires.

1 bull, "Lord Clifton," registered, $4\frac{1}{2}$ years old,	\$75.00
1 cow, "Jessie Armour," registered, 8 years old,	75.00
1 cow, "Myrca," registered, 8 years old,	100.00
1 heifer, eligible to registry, 2 years old,	50.00
1 heifer, " " " " "	40.00
1 heifer calf, eligible to registry, 9 months old,	25.00
1 heifer calf, " " 8 months old,	25.00
1 heifer calf, " " 6 months old,	20.00
1 heifer calf, " " 1 month old,	15.00

Ayrshires (pure, but not recordable).

1 cow, "Inniata," 4 years old,	\$40.00
1 cow, "Star," 4 years old,	40.00
1 cow, "Mary," 4 years old,	40.00
1 cow, "Lily," 4 years old,	30.00
3 heifers, 2 years old, at \$25,	<u>75.00</u>
16 Ayrshires in all,— total,	<u>\$650.00</u>

Guernseys.

1 bull, "Cherry Boy," No. 1252, A. G. C. C., $1\frac{1}{2}$ years old, . . .	\$150.00
1 cow, "Fanny," No. 410, A. G. C. C., imported, 8 years old,	200.00
1 heifer, "Lornette," No. 3043, A. G. C. C., $1\frac{1}{2}$ years old, . . .	200.00

1 bull calf, out of imported "Fanny," No. 410,	\$25.00
Guernsey grades: 1 cow, "Little Fan," 2 years old,	40.00
1 heifer, cross-bred, 10 months old,	20.00
6 Guernseys and grades,—total,	\$635.00

Holstein-Friesians.

1 bull, "Pledge's Empire," No. 3458, H. F. H. B., 1 year old,	\$200.00
1 heifer, "Emelia Artis," No. 4439, H. F. H. B., imported, 2 years old,	250.00
1 heifer, "Cornelia Artis," No. 4442, H. F. H. B., imported, 2 years old,	250.00
1 heifer, "Beth Hoorn," No. 4449, H. F. H. B., imported, 2 years old,	250.00
1 heifer, "Beth Arnold," No. 4468, H. F. H. B., imported, 2 years old,	250.00
5 Holstein-Friesians,—total,	\$1,200.00

Jerseys.

1 bull, "Edithson," No. 3948, A. J. C. C., 4 years old,	\$500.00
1 heifer, registered, 1 year old,	200.00
2 Jerseys,—total,	\$700.00

Grade Cattle.

2 cows, Durham grades, 9 years old, at \$40,	\$80.00
2 heifers, Durham grades, 2 years old, at \$20,	40.00
3 heifer calves, Durham grades, 10 months old, at \$10,	30.00
8 steers, various ages, at \$30,	240.00
15 grades,—total,	\$390.00

Sheep — Southdowns (recorded).

1 ram, "Comanche," 2 years old,	\$25.00
14 ewes, from 1 to 5 years old, at \$10,	140.00
15 sheep,—total,	\$165.00

Swine.

1 Berkshire boar, recorded, 1 year old,	\$40.00
2 Berkshire sows, recorded, 1 year old, at \$25,	50.00
1 small Yorkshire boar, recorded, 3 years old,	20.00
3 small Yorkshire sows, recorded, 1 to 3 years old, at \$20,	60.00
8 small Yorkshire pigs, 4 months old, at \$5,	40.00
15 swine in all,—total,	\$210.00

SUMMARY OF LIVE STOCK.

4 horses,		\$900.00
44 cattle, namely :—		
16 Ayrshires,	\$650.00	
6 Guernseys and grades,	635.00	
5 Holstein-Friesians,	1,200.00	
2 Jerseys,	700.00	
15 grades,	390.00	
		3,575.00
15 sheep,		165.00
15 swine,		210.00
Total for Live Stock,		\$4,850.00

TOOLS AND IMPLEMENTS.

Vehicles.

1 2-horse farm wagon (fair),	\$25.00
1 2-horse farm wagon, No. 2 (fair),	25.00
1 1-horse lumber wagon (fair),	25.00
1 1-horse spring wagon (poor),	20.00
1 2-horse dump-cart (1 axle only), iron hubs (fair),	35.00
1 2-horse dump-cart (1 axle only), wood hubs (fair),	35.00
1 ox-cart (good),	30.00
1 1-horse dump-cart (good),	30.00
1 2-horse bob sled (fair),	20.00
1 2-horse bob sled, No. 2 (fair),	20.00
1 1-horse traverse sleigh (fair),	25.00
1 1-horse cutter,— vehicles, \$300,—(old),	10.00

Harness.

1 set 2-horse wagon harness, complete (new),	60.00
1 set 2-horse wagon harness, complete (worn),	15.00
1 set single harness (old),	10.00
1 set cart harness,— 1-horse dump-cart,—(old),	10.00
1 lot parts of harness, halters, etc. (old),	5.00

Machinery.

1 Kemp's manure spreader and truck (good),	60.00
1 Eureka mower, 2-horse (new),	50.00
1 New-model Buckeye mower, 2-horse (fair),	25.00
1 Bullard hay tedder (new),	30.00
1 N.E. tiger horse hay-rake (new),	25.00
1 Champion horse hay-rake (good),	20.00
1 Acme pulverizing harrow, No. 6 (new),	40.00
1 Thomas smoothing harrow (new),	20.00
1 wheel harrow (old),	10.00
1 wood-slat roller (worn),	15.00
1 barn grapple horse hay-fork, ropes, and pulleys (good),	20.00

1	Syracuse steel plough, 2-horse (good),	\$15.00
1	Whittemore breaking plough, heavy (old),	10.00
1	Wiard 2-horse plough, "D" (new),	10.00
1	Hill-side plough, iron beam (fair),	6.00
1	double-mould board plough (old),	4.00
1	2-horse wooden scraper (fair),	10.00
1	hay-cutter, hand or power (fair),	10.00
1	lever hay-cutter, B. & T., No. 2 (fair),	5.00
1	root-cutter (fair),	5.00
1	corn-sheller, B. & T., R. H., No. 2 (good),	10.00
1	corn-sheller, power (old),	5.00
2	1-horse cultivators (fair),	5.00
1	1-horse cultivator (old),	2.00
1	wine-press, hand (fair),	5.00
1	stationary engine, boiler, shafting, etc. (unserviceable),	50.00
100	feet garden hose, in four lengths (good),	20.00
1	Fairbanks platform scale, half ton (fair),	25.00
2	steam-feed boxes, large and small (fair),	10.00
2	grind-stones and fixtures (old and worn),	5.00
1	wheel-barrow and sides (fair),	2.00
1	hand grain-fan (old),	5.00
3	barn ladders, 25, 22, and 12 feet (good),	10.00
1	lightning hay-knife (good),	1.00
1	common hay-knife (good),	1.00
1	bag-holder (good),	1.00
1	sliding ox-yoke, extra heavy (good),	5.00
9	ox-yokes and 20 bows, assorted sizes and conditions,	14.00
2	grain cradles (fair),	5.00
3	grass scythes and snathes (fair),	3.00
6	briar scythes and snathes (old),	5.00
6	bush hooks and cutters (old),	3.00
2	drag hay-rakes, wood (worn),	2.00
10	hand hay-forks (good),	5.00
1	long-handled, 4-tined fork (good),	1.00
6	short-handled, 4-tined forks (fair),	3.00
2	spading forks (old),	1.00
6	spades (old),	3.00
10	shovels, various (old),	6.00
6	hand hay-rakes, wood (good),	1.00
2	iron hand-rakes (old),	1.00
6	hand-hoes (fair),	2.00
4	potato hooks (good),	1.00
6	pickaxes and handles (good),	3.00
3	mattocks (old),	1.00
6	axes and handles (good),	5.00
2	crow-bars (good),	2.00
3	log-chains (good),	2.00
1	cross-cut saw (fair),	2.00
10	corn-knives (fair),	3.00

2 pairs ice-tongs (good),	\$1.00
4 barn brooms (worn),	1.00
2 dry measures, peck and half bushel (fair),	1.00
Baskets, pails, and small articles in barn and stable,	11.00
Milk-room fittings, entire (old and poor),	10.00
Total Tools and Implements,	\$1,050.00

FARM PRODUCE (harvested crops).

100 tons of hay, at \$12 per ton,	\$1,200.00
5 tons of straw, at \$10 per ton,	50.00
20 tons of stalks, at \$6 per ton,	120.00
1,320 bushels of corn, at 50 cents per bushel,	660.00
67 bushels of oats, at 45 cents per bushel,	30.00
40 bushels of rye, at 50 cents per bushel,	20.00
100 bushels of potatoes, at 50 cents per bushel,	50.00
Total Farm Produce,	\$2,130.00

SUMMARY OF INVENTORY.

Live stock, as per list,	\$4,850.00
Manure,—in barn cellar,—estimated,	170.00
Tools, implements, and machines,	1,050.00
Produce on hand,	2,130.00
Aggregate,	\$8,200.00

HORTICULTURAL DEPARTMENT.

Knowlton Herbarium (10,000 specimens),	\$2,500.00
Miscellaneous collections,	110.00
Diagrams, charts, etc. (2,500),	335.00
U.S. standard weights and measures,	100.00
Models of fruits and vegetables (550),	234.00
Collection of different woods (530),	185.00
Bottles of seeds (423),	35.00
Microscopes (9),	405.00
Accessories and slides,	266.50
Tools and teams,	482.75
Plants in Durfee plant-house,	1,500.00
Plants in propagating house,	250.00

Orchard and Vineyard.

Peach trees (1,000),	500.00
Apple trees (200),	
Pear trees (256),	
Cherry trees (50),	
Quince trees (100),	
Vineyard, 1½ acres,	750.00
Raspberry and blackberry, 1½ acres,	
Currants, ¾ acre,	
Strawberries, 1 acre,	

Nursery Stock.

Apples (10,000),	}	\$1,765.00
Pears (3,000),		
Plums (800),		
Peaches (17,000),		
Cherries (200),		
Crab-apples (450),		
Currants (3,000),		
Evergreens (5,000),		
Grapevines (200),		
Raspberries (5,000),		
Blackberries (5,000),		
Miscellaneous shrubs (700),		
Garden products on hand,		479.50
Total,		\$9,897.75

ZOÖLOGICAL DEPARTMENT.

32 mounted specimens of mammals (Mass. State Collection).
 260 mounted specimens of birds (Mass. State Collection).
 65 specimens of reptiles and amphibians (Mass. State Collection).
 92 alcoholic specimens of fish (Mass. State Collection).
 A collection of insects and other invertebrates (Mass. State Collection).
 2 models of the eye and 2 of the ear.
 2 manikins.

12 mounted skeletons of domestic and other animals,	\$266.00
15 Zentmeyer's microscopes,	576.00
46 objectives,	699.50
3 dissecting microscopes, tables, cases, etc.,	55.25
Spectroscopic apparatus, scale, lamps, stands, etc.,	99.55
Microtomes, section cutters, etc.,	68.75
Microscopic accessories,	325.30
Bacillus slides and case,	17.50
Balance, weights, etc.,	43.40
Battery, standard thermometers, etc.,	21.55
Photographic apparatus,	30.00
Glass-ware and other apparatus,	121.75
Carpenter's tools,	26.57
	\$2,351.12

MECHANICS AND PHYSICS.

Set of mechanical apparatus,	\$15.00
Whirling table and apparatus,	40.00
Hero's fountain,	12.00
Marriott's Law apparatus,	5.00

Vacuo fountain,	\$3.00
Pendulum,	3.00
Electro magnet,	4.00
Battery of 6 Leyden jars,	6.00
Induction coil,	75.00
Holtz machine,	15.00
Friction machine,	5.00
Electric bell,	5.00
Joint discharger,	2.00
Universal discharger,	6.00
Double helix,	8.00
Gold-leaf electroscope,	5.00
Fulminating panes (3),	2.00
Morse's telegraph apparatus,	2.00
Magnets (3),	2.00
Atwood's machine,	40.00
Spouting-fluid apparatus,	30.00
Air pumps,	175.00
Pair Magdeburg hemispheres,	4.00
Condensing pump,	3.00
Hydraulic press,	25.00
Magic lantern,	30.00
Inclined plane,	4.00
Pair scales,	4.00
Receivers (3),	6.00
Lifting and force pump,	5.00
Gyroscope,	8.00
Compound lever,	3.00
Inertia apparatus,	3.00
Plateau's apparatus,	4.00
Upward-pressure apparatus,	5.00
Pyrometer,	5.00
Thermo multiplier,	3.00
Parabolic reflectors (3),	6.00
Equilibrium tubes,	2.00
Illustration of buoyancy,	1.00
Condensing syringe,	1.00
Massons' apparatus,	1.00
Electric pen,	10.00
Globes (2),	25.00
Bunsen cells (40),	20.00
Crowfoot battery,	1.00
Wollaston battery,	2.00
Prude Homme cells (4),	2.00
Electrophorus,	4.00
Guinea and feather tube,	2.00
Bell telephones (2),	3.00
Thermo-electric revolving arch,	2.00
Centrifugal force apparatus,	2.62

Set of lenses (7),	\$6.87
Mirror, concave,	7.50
" convex,	1.37
" multiplying,	3.12
Anorthoscope,	7.50
Reflection and refraction apparatus,	4.50
Spectroscope,	73.50
Diagram of solar spectrum,	1.87
Prisms (4),	17.50
Convection apparatus,	1.12
Hero's steam-engine,	1.12
Syren (2 dials),	26.25
Chlodni clang figures,	5.25
Double bellows and set of organ pipes,	27.50
Violin bow,	1.25
Singing-flame gas-burner, . . . . .	.87
Reflection of sound apparatus,	10.50
Thermophone,	3.75
Stationary engine, etc.,	8.75
Platinum and silver chain,	1.87
Electro-magnetic engine,	18.85
Electric pump,	7.50
Faraday's rotating needle,	1.87
Barlow's wheel,	2.50
Electrolysis apparatus,	7.50
Quadrant electrometer,	1.12
Gamut of 8 bells,	8.87
Spiral tube,	3.12
Electric cannon,	3.12
Orrery,	52.50
Gates double-action pump,	18.37
Balance for vacuo,	1.87
Leslie's apparatus for freezing,	3.75
Mercury vacuo gage,	1.37
Water hammer, . . . . .	.87
Wind-mill and 2 sets vanes,	10.50
Appold's centrifugal pump,	21.00
Montgolfier's hydraulic ram,	21.00
Hydrostatic bellows,	15.75
" paradox,	1.37
Force pump,	10.50
Lifting pump,	5.25
Diving bell,	6.87
Cartesian figures, . . . . .	.75
Barker's mill,	2.12
Nicholson's hydrometer,	3.75
Contraction apparatus,	1.87
Set of (2) mills,	8.50
Artificial fountain,	4.50

Lead weight apparatus,	\$4.50
Transmission fluid apparatus,	20.00
Model Persian wheel,	36.75
Overshot, undershot, and breast wheels,	45.00
Will's vowel tube,	10.50
Plates for vibration (6),	2.25
Organ pipe, with glass side,	15.00
Wire gauge (French and English),	15.75
Spherometer,	21.00
Wheatstone's photometer,	9.00
Self-moving wheel,	9.00
Incidental apparatus,	230.04

Civil Engineering.

2 plain compasses,	36.00
1 engineer's transit,	125.00
1 surveyor's transit,	75.00
1 solar compass,	175.00
1 Eckhold's omnimeter,	250.00
1 Wye level,	80.00
1 common level,	50.00
1 N.Y. rod,	3.00
1 Boston rod,	5.00
8 sight rods,	4.00
3 chains, 100 feet,	25.00
1 chain, 66 feet,	8.00
42 tally pins,	2.00
1 sextant,	15.00
1 pole,	1.50
Staff for omnimeter,	9.00
Portable sliding station staff,	13.00

Total, \$3,287.26

CHEMICAL DEPARTMENT.

Collections :—

Charts: Industrial (30),	\$15.00
“ Food (7),	7.00
Collections: Fertilizers (40),	10.00
“ Food (100),	25.00
“ Industrial (700),	350.00

\$407.00

Chemicals, 69.63

Apparatus :—

Gas machine,	\$565.00
Gasometer,	18.00
Polariscope,	10.00

Carried forward, \$1,069.63

<i>Brought forward,</i>	.....	\$1,069.63
Spectroscope,	.....	\$15.00
Balance, analytical,	.....	40.00
" "	.....	60.00
" simple,	.....	2.00
Air pump, simple,	.....	2.00
Goniometer, simple,	2.75
Air bath,	2.00
Beakers, crucibles, retorts, etc.,	220.95
		<hr/>
		344.70
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		\$1,414.33

State Geological Collection.

MILITARY DEPARTMENT.

75 sabres.	3 pairs chevrons.
12 swords (officers').	93 belts and plates.
6 sashes (silk).	2 fencing masks.
10 " (worsted).	1 hub model.
137 dress hats.	18 plumes.
6 snare drums, stock, and belts.	2 gunners' haversacks.
1 bass drum and harness.	2 hand-spikes.
3 swords (1st sergeants').	Lanyards.
3 " (color sergeants').	1 prolonge.
1 Winchester rifle.	1 sponge, with rammer.
1 Remington rifle.	2 pendulum hausses.
1 flint-lock gun.	2 sponge buckets.
1 50-calibre rifle.	Priming wires.
1 army revolver.	2 tube pouches and belts..
2 color collars.	Thumb-stalls.
2 flags.	1 worm and staff.
1 camp-kettle.	1 artillery sabre.
1 coffee-kettle.	20 knapsacks.
21 tin cups.	150 tampions.





